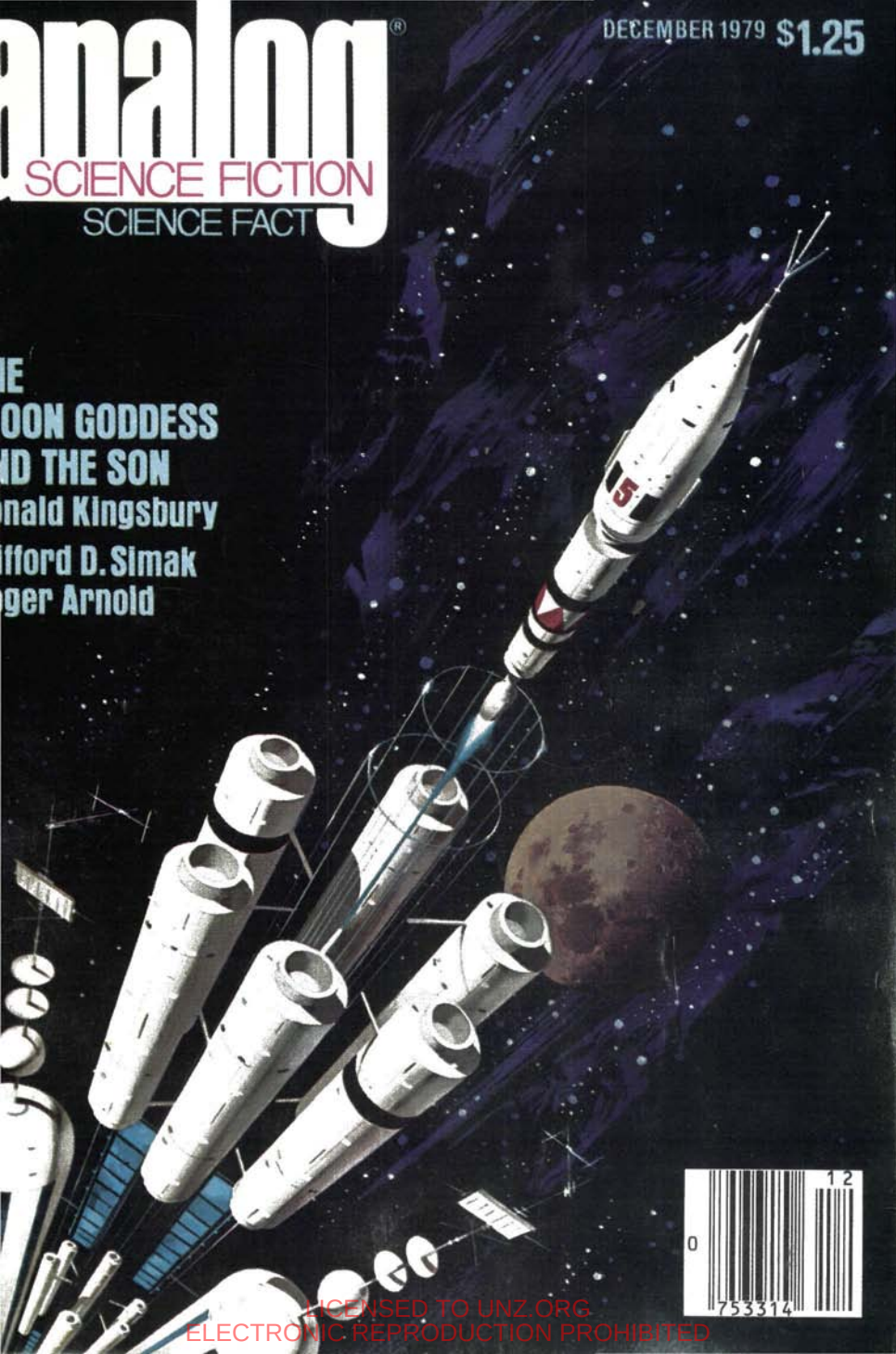

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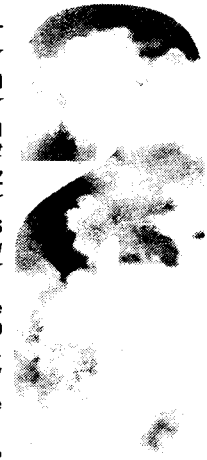
Next Issue on Sale
December 4, 1979
$10.00 per year in the U.S.A.
$1.25 per copy

Cover by Vincent DiFate

Vol. XCIX No. 12
DECEMBER 1979



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Controlled circulation postage paid at New York, N.Y., and at Concord, New Hampshire. Subscriptions: in U.S. and possessions, $10.00 for one year, $18.00 for two years, $25.00 for three years. In Canada, $12.00 for one year, $22.00 for two years, $31.00 for three years. Elsewhere $13.00 per year, payable in advance. Single copies in U.S., possessions and Canada, $1.25. For subscriptions, address changes and adjustments, write to Analog Science Fiction/Science Fact, Box 5205, Boulder, Colorado 80323. Eight weeks are required for change of address. Please give both new and old address as printed on the last label. Postmaster: Send form 3579 to Analog, Box 5205, Boulder, Colorado 80323. First copy of new subscription will be mailed within eight weeks after receipt of order. The editorial contents have not been published before, are protected by copyright and cannot be reprinted without the publisher's permission. All stories in this magazine are fiction. No actual persons are designated by name or character. Any similarity is coincidental. We cannot accept responsibility for unsolicited manuscripts or art work. Any material submitted must include return postage.

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ISSN0161—2328

POSTMASTER: SEND FORM 3579 to ANALOG SCIENCE FICTION/SCIENCE FACT, BOX 5205, BOULDER, COLORADO 80323

offices: Condé Nast Building
350 Madison Avenue
New York, NY 10017

Subscriptions:
Analog
Science Fiction/Science Fact
Box 5205
Boulder CO 80323

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I've been here almost a year now, and you've finally begun to see some of my influence—some stories that I bought rather than inherited. I, in turn, now have a better idea of how to pursue the ends I'm after for Analog. For what I've learned so far, and what I'll continue to learn, I must thank you, the readers. A lively dialogue among readers, editor, writers, and artists has long been a vital part of what made this magazine what it has been and will be.

As my first year, and the magazine's first fifty, draw to a close, it seems appropriate to make a few comments about how this dialogue works, and to answer a few common questions. Certain questions and concerns cross my desk every week, and it's probably a good idea, every few years, for the editor to sit down with the readers and lay out some answers for all to see.

Your letters, in a very real sense, are the lifeblood of this magazine. Even though the Analytical Laboratory is not now a monthly feature, and even though your letter may not be printed (space being limited), your evaluations and comments are my best form of quality control.

Naturally, an editor must be somewhat thick-skinned. Nothing pleases everybody—and a story or article which draws unusually strong praise from some of you will, almost invariably, draw equally strong condemnation from others. And, believe it or not, there are a few folks out there (not you who are reading this, of course) who are not always gentle or even commonly courteous. (A very few verge on the vicious—but that's all part of the job, and perhaps I should be grateful to provide a harmless outlet for those individuals.)

I'm always interested in hearing whatever you have to say. If you write, will I read your letter? Absolutely. Will I *answer* your letter? In general, yes, though time may not always permit a lengthy reply. About the only times

team sport *Stanley Schmidt*

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you'll get *no* answer are these:

1. If your reply is lost by the post office.
2. If a reply is obviously not needed or expected. (As with a simple list of An Lab votes or a note acknowledging something we've sent you.)
3. If a better reply would come from another department. (Subscription problems I forward to Circulation, questions about advertising rates to our Advertising Manager.)
4. If your letter deals with a particular story or article, I may pass it on to the author, who will answer if he wants to and has time. (We can't give out addresses or phone numbers, but we'll gladly forward a letter addressed to any of our contributors c/o Analog.
5. If your letter is held for use in Brass Tacks, it (and a reply, if called for) will likely show up in print, eventually. But space considerations sometimes lead to a letter's being unavoidably dropped at the last minute.

I often get questions like, "Why wasn't there a Brass Tacks column last month?" Or, "There seems to be a lot more nonfiction lately [often meaning in one issue]. Are you giving up on fiction?"

A magazine is like a jigsaw puzzle, with stories, articles, illustrations, departments, and advertisements for pieces. We can make some good guesses, but we can't be quite *sure* how they'll fit together until we try it. Sometimes, late in the production of an issue, something has to go. What goes? The key question is often, "What's about the size of the amount that we're over?" That's what happened to Brass Tacks last month. Also, sometimes special timing requirements, or a piece of unusual length, will cause the number of stories, or the proportions of fiction and nonfiction, to change for one issue. These things have always been true, as a survey of back issues will easily verify. If a department is missing one month, it doesn't mean we've abandoned it. If an issue has an extra article, or more or fewer stories than usual, it doesn't mean we're conspiring to change our basic format. It does mean we're trying to keep enough flexibility to accommodate occasional pieces which don't quite fit the "usual" format. The only *systematic* change made lately is the addition of "The Alternate View"—and that's expressly limited to a very small number of pages, invested with the hope of stimulating good stories.

Which leads me to perhaps the most popular question of all: "How do I submit stories, and what happens to them if I do?"

You are, collectively, one of the most intelligent and imaginative audiences in the world. Many of you are not content to be passive consumers—you itch to try writing yourselves. But you may hesitate because (a) you're not sure how to go about it, or (b) you're not sure I'm interested.

O.K. Am I interested in reading stories from unknowns?

You bet. I have to be. Established

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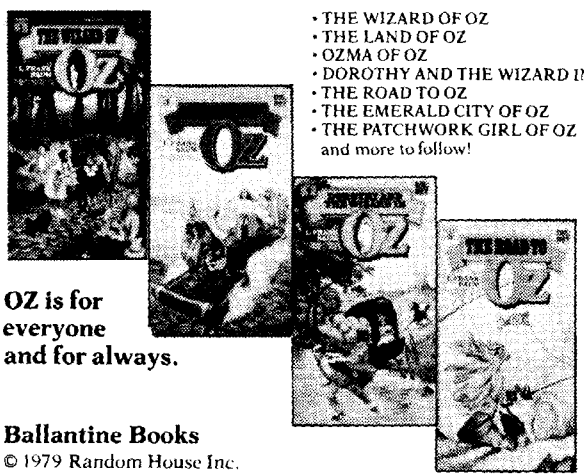

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DEL REY

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writers tend to get so busy writing books that they have little time to do short stories for magazines. Eventually they retire or die. So any magazine editor who wants to keep his magazine alive and growing *must* be constantly on the lookout for new talent. When he finds it, he must make every effort to nurture it and help it develop.

Sure, the probability that I'll buy what you submit is not large. I get roughly 50 to 150 manuscripts a week; I can buy maybe two. But stories do get bought from the "slush pile"—the "unsolicited manuscripts" from "unknown hopefuls"—not out of desperation or charity, but because they're good. Remember, every writer who is now well known started out in a slush pile. As a writer, I can assure you that life holds few greater kicks than receiving the news that you've just made your first professional sale to a market you had long secretly suspected was beyond your reach. As an editor, I've found a comparable pleasure in realizing suddenly, at the end of a long and tedious day of reading, that my attention is solidly in the grip of some writer I've never heard of before.

Incidentally, if you take another look at those numbers, you'll realize something else. Even most of the submissions from old pros get rejected at any particular market, not necessarily because they're bad, but simply because there isn't room for them all.

O.K. Suppose you want to submit stories to Analog. How do you do it?

I'm not going to tell you how to write. That's too big and subtle a subject, and there are good books to read if you're seriously interested. I recommend reading, in this order, Ben Bova's *Notes to a Science Fiction Writer,* L. Sprague de Camp and Catherine C. de Camp's *Science Fiction Handbook, Revised,* and *The Craft of Science Fiction,* edited by Reginald Bretnor. And *reread* them periodically, because there will be things that don't register the first time, but will after you have some experience to relate them to.

Meanwhile, *write*—that's the only way to learn to do it. When you're ready to submit something, make a good copy, typed with a clean typewriter and reasonably fresh black ribbon, double-spaced, on one side only of white bond paper. (Not "erasable," which smears.) Number every page and put your name and/or the title at the top. (Piles of manuscripts don't *normally* get dropped, but....) At the top of the first page, put your real name and address (to which you'd like to have a check, or the returned manuscript, sent). Under the title put the name you'd like the story to appear under—a pseudonym, if you use one, or your real name, if you don't. Also at the top of the first page, put the approximate word count—not exact, but carefully estimated to the nearest hundred words. (*Every* word counts.) This is used both for determining payment (if any) and for estimating how the story will fit into the aforemen-

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tioned jigsaw puzzle.

Always keep a copy of your manuscript. Either xerox or carbon will do, but xerox has a large advantage: you can quickly make a new submittable copy if one is lost in transit, while with a carbon, you'd have to retype. Most editors these days are willing to read a good xerox copy, but nobody wants to read a carbon.

Don't staple; use a paper clip (of adequate size). Don't stick a page in upside down to make sure I read the whole thing. I'm going to read it anyway, I can read upside down but would rather not, and such amateurish tricks serve only as a mild irritant.

A brief cover letter is needed only if there's something I really need to be told about the story—e.g., that it's a revision that I suggested. Otherwise, a letter is superfluous—it's obvious that you're submitting a story and would like me to buy it. A letter telling me how good the story is is quite unnecessary, if it's *really* that good—and a lost cause if it isn't.

Put the manuscript (and cover letter, if any) in an envelope addressed to me—along with another envelope, addressed to you, large enough to hold the manuscript and bearing enough postage for its return. (If you live outside the U.S., ask your post office about International Reply Coupons.) Then mail it, using either first class mail or special fourth class (cheaper, but slower).

That's all there is to it.

Do you need an agent? No. (You probably can't get one, anyway, until

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you've made some sales on your own.)

Should you send a query letter first? No—*except* for serials and fact articles. Short stories and novelettes I can only judge from a complete manuscript.

Can you submit the same story to two publishers at once? Some publishers won't read simultaneous submissions, others will; virtually all would much rather not. If you do it, *always* tell every editor involved. Also tell him if the story was ever sold or published before. Analog uses only previously unpublished material.

What happens to your manuscript when it gets here? Unless I'm away for an extended period, or something equally drastic, I personally read every manuscript submitted. If it's one of the lucky few, I'll buy it—or, more precisely, Condé Nast will buy English language serial (magazine) rights, leaving you free to sell book or other rights elsewhere. We pay 5¢ a word for short stories, 3¢ for long ones, and a flat $375 for intermediate lengths. If you become a regular contributor, we can pay you a little more.

If your story is *almost* acceptable, I may send it back with a letter telling you what I don't like and making suggestions for changes. This doesn't guarantee that I'll buy any revision you submit, of course—I have to be convinced that the end product *works,* not just that you went through certain motions—but it should suggest lines of thought which may enhance your chances. (Please *don't* resubmit a story that was rejected once unless you've revised it—in which case you should point that fact out in a cover letter.)

Sadly, what's most likely is that I won't be able to use your story *or* comment specifically on it. It's not that I wouldn't *like* to comment on every story—it's just not possible, with a hundred or so manuscripts a week. Even a checklist such as some writers send along takes more time than you might suppose—and is still misleading because it oversimplifies. So please don't ask for individual criticism. If your story interests me enough, you may be sure I'll comment anyway. If not, just keep trying.

You should get some sort of reply within five or six weeks at the most, and often much less. If you don't, write and ask.

Often, when a story is rejected, it's not because there's anything conspicuously *wrong* with it—it's just that there's nothing sufficiently *special* to make it stand out from dozens of others. You'd do well to bear that in mind in writing, and try to make sure your work has something—writing quality, idea content, or both—that does stand out, quite clearly and quite early.

I've been talking here about mechanical matters. The question of what *kinds* of stories I'm looking for, in terms of literary and conceptual content, is much harder. But I will have some words about that next month, in connection with some reflections on the Fiftieth Anniversary of Astounding/Analog. ■

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The Federation was out to recruit a new member world—a mineral-rich planet where madness was a way of life.

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the moon goddess and the son

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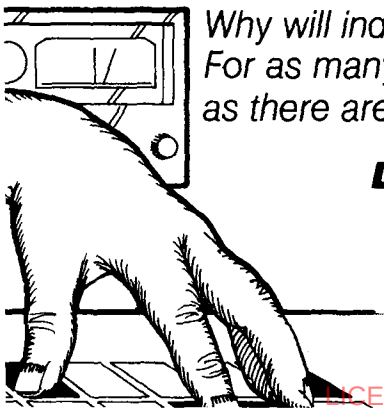
Donald Kingsbury



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1

Diana's ambition to get a job on the moon really started the day she found out that her namesake was the moon goddess. She was six and she crawled out her bedroom window onto the porch roof so she could stare at the full moon in the sky where she belonged. Her father caught her. He was furious because she could have fallen off and hurt herself so he stripped her and tied her to the bed and beat her bleeding with his belt.

The pain blotted out this man, blotted out even the pain itself. She saw a wild boar and she cast an arrow into his heart from her perch safe behind the shield of the moon. But in time the trauma evaporated, leaving only the pain of being touched by a blood stained bed in Ohio that refused to stop torturing her body with its prodding fingers. When the moon rose so high that her round eyes could no longer see it through the window, she felt abandoned.

On her seventh birthday a high school boy showed her his portable tracking telescope. The cratered mountains of the moon stunned her with their beauty—*her* mountains, *her* craters, *her* plains, *her* rills and streamers. Meticulously she located each of the old Apollo landing sites. In a moment of astral travel she imagined herself in a crater full of trees with lots of nymphs to take care of.

He showed her Jupiter and the Pleiades. Another evening they followed the bright thread of the half built spaceport as it arrowed through the southern sky in those few minutes before it faded into the Earth's shadow. When it was gone he explained that they could see the spaceport this far north only because it hadn't yet been towed into equatorial orbit.

At eight Diana had a temper tantrum and stoically endured five beatings until her mother papered her wall with a photomontage of the moon's surface. At nine she took up archery in school and worked at it until she became the regional champ for her age. When she was ten she ran away from home to visit a space museum but the police brought her back. After the police were gone her father beat her until even her mother cried. At twelve she ran away from home with her arm in a cast, broken by her father when he found her collection of newspaper stories about families who murdered their children in the night.

She fixed her hair like the March cover girl of *Viva Magazine* and she wore one of her mother's bras stuffed with an extra pair of socks. People gave her rides. She told them she was going to visit her mother in California because her father was out of work.

The best ride she got was from a truck driver whom she targeted at a diesel station in Newton, Iowa, mainly because his rig carried a Washington license plate and she knew vaguely that spaceships were built in Washington. He wasn't supposed to take passengers but she flaunted her spare socks and he broke down and got to liking her over the steak he

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bought her. She chattered to him about a historical novel called *Diana's Temple.*

An endless ride later, through farmland and broken hills and over decaying interstate highways, they pulled into a rest stop near Elk Mountain to sleep in the cab for the night. Diana tried to seduce her driver because she thought girls were supposed to reward nice men. The cast on her arm got in the way and a sock fell out of her bra.

He laughed, holding her by the chin in a vice grip between thumb and fingers. "Diana was a virgin."

"Yeah, I know." She cringed out of the vice to a position back against the door of the cab.

He didn't want to hurt her feelings. He reached out and pulled her shoulders into his large arm tenderly. "Your virginity is the most valuable thing you have right now. Hang onto it. Grow up a little bit and when you throw it away make sure he's the nicest guy in the world."

"How do you tell the nice guys from the mean ones?"

"Did you ever have any trouble with that?"

"My father always beat me. For *nothing*!"

"Then you know what the bad ones are like."

"What are the good ones like?"

"Me," he laughed.

For a year Diana stayed in a small town near Seattle where they assembled feeder spacecraft for the spaceport as well as cruise missiles for the military. The tiny nine-meter long automatic lighters rocketed to the spaceport from an equatorial base and flew back on stubby delta wings. Diana was excited at first. She did housework and cared for the children of one of the foremen whose wife was recovering from an auto accident. But this sleepy Earth town was just as far away from the moon as Ohio.

She stole some money and caught a bus for L.A. It was scary panhandling in Hollywood. She got picked up by a pimp she didn't know was a pimp and had to crawl out a window in the middle of the night and sleep under a car like a cat. After three days alone she found a family of runaways and slept on the floor. They were all into stealing and hustling and one of them was into heroin but she found a job as a waitress from which she got fired because she didn't have any papers.

Twilight was panhandling time. Afterwards she took her addict friend to a crowded basement dive so she could have company being depressed. The smoke coiled through the dim light, choking at life. She sat there crazying and suddenly darted toward the ladies' room where she knew they had a little open window where she could breathe for a minute, alone.

A large hand clamped on her shoulder. "You got holes in your head, spending time with that buzzhead? He'll take you for everything you' ve got."

She whirled on the scruffy young man who had a 1950 hairdo. "What have I got to take? I haven't even got a job."

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"Lots of jobs around."

"I don't want to be a whore, smartass."

He smiled sardonically. "A waitress, then?"

"I got fired as a waitress because I don't have any papers."

"How about that!" He shook her hand. "I'm a forger." He escorted her into the ladies' room and, after locking the door, hung his head through the window. "What name you want to be known by?"

"I can change my name?"

"Yeah and you get a birth certificate and an L.A. high school record and a social security number. I figure if we stretched it a bit you could pass for eighteen."

"What do you get out of it?" she asked cynically.

"A girl to ferret around records offices who doesn't arouse suspicion. I need new faces all the time." He laughed. "I'm square. My side lady would kill me if I didn't give every thirteen year old an integrity deal."

"Could I get a job on the moon with your papers?"

2

Charlie McDougall was an only child with thickly lashed eyes. He first learned to roll his eyes at his parents when he was thirteen—behind their backs. His whole memory of life was of two giants giving him orders that had to be executed on some strict schedule if he didn't want to be driven crazy by shouting directed into his eardrum.

Mama wanted him to become the world's greatest violinist or maybe a dancer who would wow them in Moscow. Papa wanted him to become the greatest space engineer who ever lived, the cutting edge of the Last Hope of Mankind.

During those crucial years when most babies discover the first spark of individuality by playing with the power of the word "no," Charlie had been broken. He learned to obey. He hated the violin and he hated dancing and he hated space but he hated screaming parents even more. Obeying was the only peace he had.

Still while he became a fine violinist, his strings had a perpetual habit of snapping. He was invariably the best dancer in his class but he was always being thrown out because of his incurable habit of peeking into the girls' dressing room.

For his father he devised even more diabolical tortures. Though he slaved dutifully over his physics and chemistry and math and model building, he refused to read science fiction. On his fifteenth birthday his father tried to seduce him with a luxury hardbound copy of *Dune* with a facsimile Frank Herbert signature.

"You'll love it."

"Hey Papa, that's a great gift. This evening I have some spare time and maybe I'll take a crack at it." When his father went out for a beer, he rolled his eyes.

That evening the old man peeked into his room on tiptoes to see how the first chapter of *Dune* was going, just as Charlie knew he would. Charlie was

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engrossed in the eighth chapter of Robert's *Differential Equations* setting up the ninth problem.

"Have you had a chance to look at *Dune*?"

"Tomorrow. I got myself hung up on the breaking mode of long cylinders and I don't want to sleep on it."

The coup had kept Charlie happy for weeks. *Dune* was still on his shelf, unopened.

It was only when he was seventeen that he discovered the perfect shelter from his parents, digital music. Electronic instruments frightened his mother. She had a Ph.D in musicology from Mills but couldn't tell a fourier compact series from a quartet concert series; a resistor had something to do with the draft, and a chip was what an uncouth person carried on his shoulder. As for Charlie's father, who polished off textbooks like most slow readers polished off light novels, engineered music was in the same category as purple smells or painted cooking.

Waves, repetitions, pulsations, rumblings, the rise of a violin taking off can all be described by a fourier series—an amalgamation of sine and cosine waves of different frequencies and amplitudes. A frequency is a number. An amplitude is a number. Charlie composed by choosing those numbers and deciding when they were to change. His computer executed the commands.

He created his own computer language for simulating instruments. It was a simple matter for him to write a subroutine for oboe or violin or harmonica. He had ten violins on file, four of them matching in sound the finest violins ever crafted, the other six of a haunting timbre that could never come from a material violin, wood lacking the proper resonant qualities. He doodled up new instruments in pensive moments and gave them frivolous names like the pooh and the eeyore and the kanga.

By using his world of numbers as an open sesame to the trance underground, he burrowed assiduously into this dark world his parents couldn't understand. Once when he was twenty and deliriously celebrating the end of his junior year by smashing out in the popular Boston Trance Hall where the show was continuous and the waitresses sported silver pantsuits with cutout buttocks, all seven of his friends became dazzled by the nubility of the singer. She was wearing a golden necklace from which her dress flowed, cupric green, so slashed in a thousand ribbons that one both saw all and none of her body as she sang.

Charlie noted the ordinary voice—slightly brassy with a tendency to slurring—and rashly bet his friends she would date him. Gleefully they put $200 in the pot, impelling him to keep pace by taking her hand as she left the stage.

"You have a zorchy voice—a lot could be done with it."

She smiled coolly and let him hold her fingers just long enough to appear unrude. It gave him time to press his card into that hand, a hand so cold his must have seemed tropical.

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ELECTRONIC MADMAN
DIGITALIZED MUSIC

Her eyes widened slightly when she read it—DM was a controversial thing on the pop music scene; one loved or hated its sounds and argued endlessly about the awesome scope of its territory. DM projected mystery and resentment. Few musicians could handle its technical demands. But an ambitious woman with an ordinary voice would know what a DM magician could do for her.

She sat down and the cupric cloth rippled, sometimes revealing, sometimes hiding, always teasing. "What do you hear in my voice?"

"You'll have to come to my place and listen. It's beautiful."

"It's not. I don't think my mouth is the right shape."

"But you don't hear what I hear."

"Do you do real time or augmented?"

"Both. I can feed your mike right into the shoebox if that's what you want."

She took his palm and read it silently. Then she looked into his face with the eyes of a judge. "What sign are you?"

"Aquarius."

Her face broke into a smile of relief. "Fantastic!" And she wouldn't let his hand go. Charlie's friends, conceding, shoved a money filled envelope into the other hand.

Betty worked with him. He showed her many versions of her voice. He washed her car. He rushed her clothes out for dry cleaning to give her extra sleep. When she had a new gig, he set up for her. He worked late into many nights decoding the structure of her voice until he was able to customize a shoebox that transformed her into a siren at the wave of a mike.

Charlie's new life thrilled him. He spent all his time thinking about seducing Betty. Devious plans grew out of dreams and finally he convinced Betty to let him move into her place in what had once been the maid's room back in the century when Irish labor was plentiful. He promised to cook and do the dishes and not molest her. His theory was that the way to a girl's heart was through her stomach and after a month of being taken care of by a man who loved her, she would melt.

In a mailgram that gave him great pleasure to write he told his father that he was not returning to MIT. Within a week his father arrived in Boston from orbit and charmed Betty off to Mexico City for a vacation. She sent him a card from Xicotencatl wishing he was there. The card was forwarded to New Hampshire where his mother had taken him by the ear, screaming at him all the time, insisting that if he wasn't going to continue his engineering he had to sign up for the Berlin Conservatory. In self-defense he reregistered at MIT, all the while plotting perfect murders.

It took him only two months to utterly crush his mother. He digitalized a secret recording of one of her screaming rages. Slowly he added harmonicas. He mushed the words until their content was lost against a pure emotion. Here he amplified the rage,

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there he added piteous undertones. Violins played at dramatic moments. Sobbing children filled the silences. He had the tape cut and sold the pressing to a company that pushed it up to thirty-second place on the hit parade.

Charlie figured it would take longer to crush his father. His father was tough. He would have to bide his time and strike at an unexpected moment with overwhelming force.

3

It was a nice name. *Diana Grove*. She could go anywhere and do anything with it. Mostly she went to Texas and Arizona because John the Forger's main business was manufacturing new identities for Mexicans. When she became too well known he let her go and she became a waitress.

Rooming with older girls taught Diana how to imitate adult behavior. Her manners became flirtatious. She was a sassy summertime flower to the bees, little caring whether the men she attracted were young or old or handsome or married—but she never dated the same man twice. She had a perfect excuse whenever an admirer wanted a second date.

"But that's the day I'm seeing Larry."

"How about Saturday then?"

"I always go out with George on Saturday."

When too many people wanted her, she changed jobs or roommates. Eventually she began to move up the coast, carefully picking only the most expensive and popular restaurants. Once in Coos Bay, Oregon, a drunk wacked her around and that so frightened her she flew to San Francisco the very next day.

Not having a job was unimportant. At the airport she bought a paper and answered a classified ad demanding an exceptionally attractive and experienced waitress to work at Namala in the Pacific. Diana was a long time space buff and knew very well that Namala was one of the equatorial stations that supplied the orbiting spaceport.

The secretary of Ling Enterprises smiled and Diana reciprocated. It helped her nervousness that the secretary was sitting down and she was standing. She could pretend that she was just earning a five-dollar tip.

The speaker beside the video camera spoke in a gentle voice. "Send her in. She's expected."

Diana instantly turned her smile on the camera. It was President Ling speaking. That was very suspicious. Presidents of restaurant chains did *not* interview waitresses. She felt faint and, what was worse, she felt fifteen years old.

When she peered around Mr. Ling's door she found him to be Chinese and ancient. His office was Contemporary American except for the paintings—a battle between Earthmen and beastoid in a jungle under a large red sun, the other a desolate landscape somewhere in the galaxy near a star cluster. The fear went out of her.

"You're another space cookie," she said relieved, all her poise back.

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"It's a comfortable disease."

"Do you remember when they landed on the moon?"

He laughed. "I'm so old I remember when they thought landing on the moon was impossible."

"Do you own a restaurant on the moon?"

"No, but when they build one, I'll be running it."

She loved him already. She was his slave. She sat down on the couch and couldn't take her eyes off his face, lined and old and frail and the most fascinating face she'd ever seen.

He moved closer to her, sitting on the desk top. "Are you wondering why a president is interviewing waitresses?"

"Yes," she grinned. "I'm ready to run out the door screaming."

"I have six space related restaurants and I take a personal interest in them. The frustrated astronaut in me."

"What's Namala like?"

"Hard work for you. Too many men."

"I'm a good girl and surprisingly self-reliant."

"Sometimes you'll need advice. Madam Lilly, who runs my Namala franchise, has large skirts for hiding behind when it is necessary."

"I never need help," said Diana defiantly.

"An unwise consideration."

They talked. He found out all he needed to know and she found out all she needed to know. He offered her the job. She accepted. There was nothing more to say but she didn't want to leave just yet.

He watched her silence as she moved her fingers and played with a ring. "Ah, I've finally caught you when you're not smiling."

"I'm hungry and I want to invite you for lunch," she said with frog's legs in her throat.

He smiled a thousand wrinkles.

"Would your wife mind?" she then asked awkwardly.

"I'm a widower."

"We could go to the Calchas. I've worked there. It's beautiful and I miss their food."

She made him talk about himself over too much wine. He was the rebel in his family. His father wanted him to take over the restaurant business and he wanted to be an engineer. He had edited a science fiction fanzine called *Betelgeuse* which went to fourteen issues but when he became engaged to his illustrator who was a Caucasian, his family disowned him. He didn't do well enough in school to get a scholarship and ended up as a city bureaucrat, married, with three lovely mongrel children while he tried to write at night.

Finally his father died and his brothers expanded and took the family fortune into a close brush with disaster and he made a pact with his mother to run the family business. He was good at it. Later he made his breakthrough by discovering how to franchise variety in a world of Macdonald's, Johnson's, and Colonel's.

Diana had fun. They ran up quite a bill at Mr. Ling's insistance (he

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thought he was paying) and she had the best fight of her life taking the bill away from him. To make up for it he bought her beautiful luggage. She sighed and told him she had nothing to put in it, so he bought her clothes. She sighed and told him she had no place to take them because she hadn't rented a hotel room yet, so he gave her the key to his place.

She cooked Mr. Ling a gourmet dinner in his kitchen after making many phone calls to the office to find out what he liked and when he would be in. They spent the whole meal and three liquors discussing the history of Jerusalem. She discovered his wicked sense of humor. He convinced her that there had been a whole order of Chinese Knights who fought in the crusades.

"Don't laugh so hard!" she complained. "You're just lucky I didn't bake a lemon meringue pie for supper or you'd get it right in your kisser!"

Ten o'clock was his bedtime. He excused himself gracefully and escorted her all the way to the guest room where he put an arm around her shoulder and thanked her for a lovely evening before he left her.

Diana peeked. She waited until the light went out under his door and then, dressed only in a candle flame, entered his room. "I've come to kiss you goodnight." It was easy to pretend you were twenty years old when you were nude.

His smile in the candlelight was wistful. "Goddess Diana, I am much too old for such escapades."

"That makes us even. I'm much too young for such escapades." She blew out the candle and slipped under the sheets with him. "Don't die of a heart attack just yet. I want my job on the moon." She snuggled up beside him, deciding that she liked to sleep with men. It was the sleep of innocence.

The next day a great aircraft flew her over the ocean to the equator.

4

The rocket-supplied lunar base was an improbable cluster of forms on Mare Imbrium which had lately grown a spider web rectenna farm to receive microwaves from a small twenty-five megawatt solar power station that had been built in low Earth orbit and towed up to the Lagrange 1 position 58,000 km above the moon. Each new addition was part of a single-minded plan. The sole purpose of the base was to build an electromagnetic landing track so that access to the moon might be made cheap. This deep out in space, rockets fueled from Earth were not cheap.

When Byron McDougall took the assignment to construct the initial lunar base he was given one-fourth of the money originally allocated for that task. He was a military man from a military family. He thought like a soldier who could still fight when his supply lines had been cut. McDougall's base had shafts without elevators. He used cast basalt instead of aluminum. Eighty percent of the parts by weight of all imported machines were made of lunar metals and glasses. All food was raised locally.

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The lunar day was given over to energy intensive tasks such as metals production. The lunar night was given over to effort intensive tasks such as design work and machining.

From his tiny office Byron called Louise. "Sweetheart, do you have a bottle of champagne tucked away?" He knew she didn't.

"Champagne? You're mad. All I have is a liter of Ralph's turnip rotgut."

"Too bad. How can we celebrate on that? Any last minute hassles with the SPS?"

"No. We should have power exactly on time."

"Good."

"Your son has been trying to reach you. We'll have the connection set up in fifteen minutes. Do you want to take it there or here?"

"I'm hopping right up to the control room."

Byron switched off, smiling slyly. He took out a half bottle of champagne he had hidden, all he could afford to smuggle in by rocket, but enough to give them a taste of victory. It wasn't really victory: getting the SPS power so they weren't energy starved at night was just another milestone, but one certainly worth celebrating.

Maybe there never would be a final victory. Byron sometimes despaired. Maybe in two years this effort might be a ghost town in spite of all the billions that had been invested in it. Risk funding was so damned erratic. Support waxed and waned in Congress. It had been waning now for years, even though the pay-off was a certainty.

He slipped out of his office, soared up the shaft, caught himself, and made his slow leap into the control room with the bottle high in his hand. "Who's got strong thumbs?"

"How did you get that!" Louise's nature lent itself to exclamations.

"False bottomed suitcase."

One of the men turned to Byron from the console display with a smile. "The SPS is powered and checking through beautifully. We should get the first beam down soon."

"Is your son as handsome as you?" asked Louise dreamily.

"Why should you care?"

"Braithwaite was telling me he's coming up here to work on the track as soon as he graduates from MIT."

"No, I'm much better looking than my son. You should try older men once in awhile."

"Not a chance. You see through all of my tricks. I *might* get away with batting my eyes at your son. He's six years younger than I am."

"Actually you might have a chance. When he gets here I'll set you up. He chases older women—but I've never seen him chase one as bright as you. I once took a girl friend of his off to Mexico City. She was a great lady, but I was bored to death with her chatter."

"Byron! You stole your son's girl friend? How could you be so cruel? And I always thought you were such a *nice* man!"

"I did him a favor. She was using

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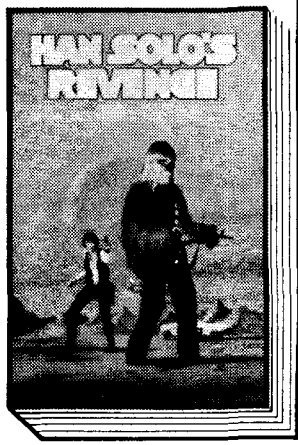

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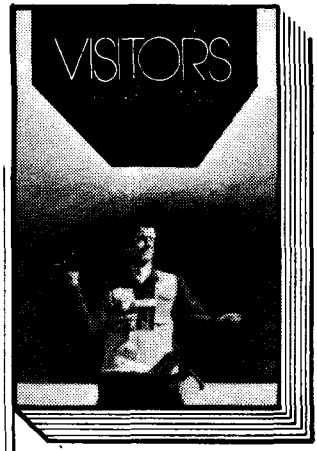

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him," he said bitterly.

"He probably needed her!"

That stung Byron's anger. "Like hell he needed her. She didn't have enough sense to send him back to school when he quit to take care of her. For that I could have killed the bitch. I shipped her off to Paris with enough bread to keep her amused."

Louise was grinning. "What was your wife saying about all this?"

"She divorced me."

"Byron!"

He laughed. "Something else to celebrate."

The phone rang. Louise took it and chatted with the operator. "Byron. It's your son."

"Hi Papa."

"Charlie!"

Two second pause.

"I'm calling you up to congratulate you. I hear you're not going to need candles at night anymore. Hey, pretty soon you'll have hot running water in the trenches."

"It's pretty good. We'll be powered except for six hours once a month at eclipse."

Two second pause.

"I just got your comments on my last batch of homework. You're two days faster than my profs. I'm glad I'm getting clever enough with my mistakes so even you can't see them."

"While you're on the line I want you to talk with Braithwaite. You'll be working with him on the lunar track. He's anxious to get you after all he's heard about you."

Byron motioned frantically for Braithwaite to come over while his voice travelled to Earth and his son's came back.

"You still want me to get involved in that thing, eh?"

"You bet. When we get it built this place is going to start to pay for itself. She'll mushroom. We've been tooling up for the track and now that we have the power, we're ready to roll."

The lunar track was an electromagnetic cushion to take fifteen-ton ships in for a horizontal landing at lunar circular velocity. Or shoot them off.

"Say Papa, I'm calling to tell you not to bother to come back to Earth for my graduation."

"But of course I'm coming. I need the vacation."

Two second pause.

"Yeah, but I just quit school."

"You're at the top of your class!"

Two second pause.

"I don't want your job. I just want to play around and listen to the birds sing. Why put myself in the position where I need a vacation when I can have one all the time?"

Byron thought frantically. "It's the chance of your lifetime! It will make your career! From this job you can go anywhere!"

Two second pause. There was no real way to argue over this distance. He had caught a barracuda and the line was too light.

"I never liked engineering. Good luck in your log cabin. I'm hanging up, now."

The line went dead. Byron waited

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for two seconds, stunned, then he smashed his bottle against the bulkhead wall. Gracefully the champagne foamed as it arced in a slow motion spatter.

"She's ready," said the operations man, as calmly as if he had witnessed a christening. "There she goes. The grid is powered."

Louise was rushing over to Byron. "It's all right."

Byron was frozen, his hand outstretched where it had grasped sudden defeat from victory. "No," he said in pain.

"Are you going back to Earth to talk to him?"

"No." Byron paused for two thoughtful seconds, his hand slowly sinking. "I had to push him and push him and push him, the little bastard. He did so well, I couldn't resist. If I didn't push him, he didn't move. So I pushed him. God, how I wanted him here under my thumb where I could make a man out of him." He shrugged bitterly. "It's no use. If you have to push a man, he's not going to move anywhere."

"He'll settle out."

"Yeah, he'll settle out. He'll settle out as a third rate musician."

5

Namala was the tropical sea, blue water and a sometimes billowy clouded sky and green islands that, to Diana's airborne eyes, seemed to sleep in the vast moat of the Pacific like a drowsy crocodile. She arrived at sunset while the water was deepening to purple. Never in her life had she been so exhilarated. She was here—part of a base that was shipping goods to the moon to make a home for her that would be there when she found a way to go.

While she waited on the airfield terrace for Madam Lilly, the drowsy crocodile woke. A barrage of delta winged lighters began to lift in roaring flame from the launch area. Then Diana saw to the west the silver thread of the spaceport rising majestically out of the ocean. At first it was only a small thread, a wavering glimmer. On the horizon the spaceport's 150-kilometer length was foreshortened to hardly more than a degree of sky, but, within minutes, as it rose to the thunder of the lighter launches, it grew to stretch its gossamer strand over almost a sixth of the sky—before vanishing into the shadow of the Earth, leaving only stars. She remembered a spider riding a filament of web over the cornfields of Ohio.

Soon another fleet of lighters, electromagnetically ejected from the spaceport as it passed overhead, began a screaming drop out of the blackness, swooping into the floodlamps of the lagoon to be received with the efficiency of a squadron returning to the deck of its aircraft carrier. Some of the lighters were laden with goods manufactured in the factory pods that lined the spaceport's length like factories had once sprung up along a railway spur line. Some of the lighters came down empty.

The ground crews ran a standard maintenance check on each vehicle,

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inserting a new 500 kilogram payload module, pumping kerosene and oxygen into the tanks, recooling the superconducting coils that would electromagnetically accelerate the lighter once it had been swallowed by the spaceport's electromagnetic intestine on its next spaceward trip. Finally the fresh readied lighter was rolled to the launch site and pointed at the sky on its own gantry, there to await the return of the spaceport. Every ninety minutes, day and night, this cycle repeated at all of the equatorial stations.

Madam Lilly was standing behind Diana, unwilling to intrude on the girl's rapture. She turned out to be a hard taskmaster. Her restaurant carried the Ling symbol but like all Ling restaurants it supported its own name, the *Kaleidoscope*, which meant that it was constantly changing its atmosphere. Madam Lilly was a theater person. She could do miracles with a few props and backdrops and screens, but her main focus was on the girls. She costumed them perfectly and taught them gesture and emotion and expression and dialog.

When Diana arrived they were doing World War II. There was a Rosey the Riveteer in slacks and a Sultry Pinup in black negligee. Diana served the veranda in shorts with a tray over her head as a Hep Carhop. Sometimes she chewed gum and she always said "swell" to the customers. The music was "Deep in the heart of Texas..." or "Kiss me once and kiss me twice and kiss me once again, it's been a long long time..."

Namala was a paradise for a girl scared of men. The ratio of single men to women was four to one and she had so many dates that she could easily play one against the other for safety. If that failed, Diana pleaded work. She had to rehearse the movements of a Burmese dancer, or walk like a Persian lady, or catch the subtle way a geisha presented a plate of raw fish. You could find her laughing with her arms around two men, or alone on the beach in the moonlight watching the fireworks supply the spaceport.

The beach could be fun. During the *Kaleidoscope's* twenties' stint Madam Lilly strictly forbade her girls to wear their monokinis and instead had them splashing about in the latest daring flapper bathing suit that exposed the knees. It caused a riot and was very good for business.

Time and the smallness of the Namala community was her enemy. She met a boy named Jack in her martial arts class. He always spoke to her; she consistently ignored him. Their Japanese instructor repeated that the greatest perfection was to defeat an opponent with the minimum of force. Diana was having none of that. She was there to learn how to *demolish* men with the thrust of her heel or the back of her hand. She believed in a safety factor of ten. Break their skulls and then ask questions.

But Jack survived. Smitten, he arranged a surprise birthday party. There were twenty-one candles on the cake even though she was only turning

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sixteen. She had a fabulous time hugging everyone for their gifts and singing and fooling around. She successfully avoided Jack for three hours knowing how dangerous a man in love can be.

Her fatal mistake was to need a Kleenex. Jack kept some in his study which had remained off limits to the party because of the delicate model of the lunar base he kept there. She caught a glimpse of its detail and fell heels over head. Long after the revelry had died she was still in the study, her arms wrapped around Jack kissing his nose and asking him questions about the lunar electromagnetic landing track.

The affair lasted two weeks, a miracle of involvement for Diana. She went everywhere with him. She haunted the launch site when he was at work. He spent all his money at the *Kaleidoscope*. They went surfing together and kissed at every opportunity. He hinted that he wanted to sleep with her. She hinted that she wanted to wait but to herself decided that he was the nicest guy in the world and she was going to throw her virginity away on him and live happily ever after.

In time they found themselves alone. Unhurriedly, gently he began to undress her. Diana only noticed that he was between her and the door. Since she had been a small girl she had learned to keep herself always between her father and a door. For awhile she tried to suppress her silly need, but the anxiety didn't go away —it became worse. It became imperative. Smiling at her insanity she took Jack in her arms hoping to roll him away from the door, toward the wall, without having to say anything. He chose that moment to be assertive.

Suddenly panicked, Diana threw him off the bed. When he looked up in anger, still commanding the doorway, she was so terrified that she struck him with a reflex karate kick to the head, and ran, not remembering that she ran. The next day he apologized when he found her. She turned away without speaking.

He flew in flowers from the States. He sent her letters. He papered love declarations on the corridor walls of her apartment. He slept on her steps. His intensity frightened her. She stayed awake with images of him murdering her. When he came to the *Kaleidoscope*, the other girls waited on him. Madam Lilly soothed her and told her that it was normal for men to go crazy, that it was nothing to worry about, but Diana worried. Jack persisted. He even sent one of the female mechanics he worked with to talk to her. Diana became so upset that she wrote Mr. Ling a mailgram pleading for a transfer.

The reply bounced back via satellite and was printed up immediately. "Spend a week with me. Ling."

6

At the emergency meeting in the main control room of the lunar base Zimmerman told a joke about a congressman that ended with the punch line: "I got no luck at all, nohow. Jist as I was gettin' my ass trained to work without eatin', she has to up and die

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on me!"

It wasn't a funny joke when you were the ass. They poked at the budget cut and they went over their own expenses from five different angles. No sane way of handling the cut emerged.

During the next shift out on the lunar plain, Byron chewed over his anger in one of the construction trucks along the half built track. His mind kept wandering off to Earth, that goddess of inconsistency.

One year you had Congress convinced that what you were doing was in the economic self-interest of the United States. You'd ask them if they were *sure* because you wanted them to be *sure* before you went ahead. Yes, they were sure. They backed you to the hilt. They made laws. But the next year they were convinced of something else, riding some new fad.

Back at the base Byron took dinner in his room. He cut off the intercom and tended his climbing vines, still seeking a solution to this latest sudden change in the rules. Adam Smith was wrong; men were not motivated by self-interest—they were too myoptic to perceive self-interest farther than an inch away. A man would grab for that cigaret because the pleasure was immediate; the surgeon's knife cutting out his cancerous lung lay an unreal fifteen years in the future.

Byron's eyes blurred and for a moment he beheld a religious vision. A luminous hand was reaching out of the stars and that hand was a mosaic of little men held together by little hands in the pockets of the men above. Each little man was complaining about somebody else's greed. The conquest of space was not, at the moment, a gloriously cooperative venture. It was a war of pickpockets. But war gave him an edge. He smiled. Byron was an old fighter pilot.

His fingers switched off the lights so that he was in total darkness, the bed easy under his body. What did a soldier do when he was cornered? He remembered one of the favorite maxims of his father. "There is no such thing as losing," said that very stern man. It was an absurd maxim, parochially American, but one his father could imbue with a peculiar vitality.

As a ten year old Byron had been no fool. "That's what Hitler said at Stalingrad," he argued hotly.

"Ah, but Hitler confused winning with being on the offensive. You and I would have retreated and won."

"We retreated all over the place in Vietnam and lost!"

"Son, recall that you and I were in Germany during that disgraceful affair. Real soldiers aren't so clumsy as to defend something by destroying it."

"What's a real soldier?"

"An ordinary soldier fights well when he is grandly equipped. A *real* soldier can still fight after his supply lines have been cut. A real soldier doesn't even need any help from Congress!"

Once on a 300-kilometer hike with his father he had crumpled, refusing to go farther. The pain was overwhelming.

"A man inured to hell cannot lose."

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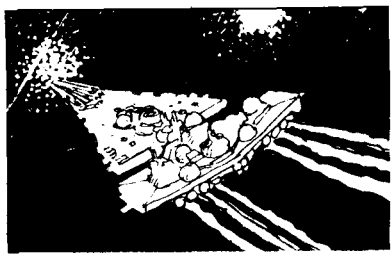
"He can die," Byron remembered himself whining.

His son-of-a-bitch father had then lifted him up by the hair. "No. You forget. Death comes first. Then hell. Get moving. McDougalls are tough enough to walk out of hell. You're that tough. We make camp in two hours."

Byron walked out of his father's hell into an Air Force recruiting office on his eighteenth birthday. The Air Force groomed him, disciplined him, toughened him, and then sent him to Saudi Arabia to train Bedouins to fly the F-15. It was hell. He found himself drawing upon his father's wisdom about coping with hells because it was all he had. He used that empty time in the desert like a good commander might use a lull in the fighting—to build up his striking power. He sweated out an engineering education by correspondence course.

In those days few Americans cared about space, not even Byron. NASA's program had collapsed to a dismal four shuttle fleet with no solid funding in sight. Russian space ventures began to show signs of life again and Congress frantically authorized the building of the spaceport, giving Rockwell a contract for 70 modified space shuttles. Byron found himself flying one of them above the Earth, above a vision that shattered his isolation.

He resigned from the Air Force and transferred easily into a spaceport construction crew, engineering with love where no men had built before, 275 kilometers above the silly wars in



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Africa and Afghanastan and Argentina. That was a boom time. Today it was bust.

Yes, it is like war, he thought there in the dark. This was a battle to take the high ground. You won some and you lost some. The battle up the slope always cost more than you wanted to pay. Sometimes the home front got tired of the war. Still you kept on fighting your way higher in the hope that once you reached the peak you could dig in and hold it cheaply.

The first low orbital spaceport had to be built on the money of incredibly expensive orbital rockets, but once in place the 150 kilometer long, double barreled spaceport could swallow, and electromagnetically accelerate cheap suborbital rocket freighters and

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spew the unloaded freighters back down again to maintain momentum equilibrium. But that wasn't the end of the battle. That was only a ridge, a defense line, a trench.

The 275 kilometers wasn't high enough. As long as more mass was rising than falling, momentum balancing of the spaceport required a net energy input into the spaceport's mass drivers. That assumed an expensive auxiliary orbiting power plant which tended to limit spaceport capacity. And so the astronautical strategists began to covet the really high ground, the moon. If lunar mass could be delivered to Earth through the spaceport, momentum balancing of the spaceport would cease to depend upon auxiliary power. Capacity would go way up and costs down. If more mass was going down than coming up, the spaceport would generate a net surplus of power. A kilogram of moon delivered to the Earth contains eight times as much energy as a kilogram of the most powerful chemical rocket propellant.

The dust at the bottom of a minor lunar crater holds more energy reserves than in the whole of the Arabian peninsula. The potential energy of the moon is enough to power the wildest space program for millions of years. Damn the cost! Capture the high ground! Economics demanded it!

And so the war went on. Byron McDougall was chief field engineer when the second spaceport was built parallel to the first. It was designed to accelerate vehicles to high orbit beyond the Van Allen belts and to receive the vehicles back from high orbit. He did the job in three years.

By then congressional support was disintegrating. The Russian tortoise had fallen behind again. Wars are not fought on the battlefield alone. They are backed up by a whole support structure. And a loot hungry populace is impatient with long sieges.

His father had something to say about long wars. "When the enemy's line is solid, endure, survive, and observe. Do not expect a break to appear at an enemy strong point. The breaks appear where *no one* expects trouble. When they appear victory goes to the swiftest. A place which has no strategic importance may achieve importance simply because it is not being defended."

7

Every civilization contains eddies of its past, sometimes within walking distance of its major centers. An eddy of the nineteenth century lay tucked away between two mountains of the California Coast Range, below the grasslands where the topography traps enough ocean fog to water a redwood stand. A Chinese family has long owned a log cabin there beside a dammed stream. There is no electricity. The road is dirt. Legend has it that every time a land developer comes this way, the wood nymphs call up a fog from the sea to sift through the redwood forest until it becomes invisible.

When Diana was with her Chinese friend she was all woman. At night she lay cozy with him under heavy

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blanket, by day she cooked over wood for her sage—flapjacks with sweet fried tomato syrup, and eggs and beans and bacon, even bread from flour and yeast. She kissed him and swam with him behind the dam and massaged him and flattered him.

But when she was by herself she reverted to girl. Deep in the forest she built a shrine out of stone to the goddess of moon and glade so that Diana might properly be worshipped. She tracked animals but they got away. She practiced archery for hours. Once she saw a deer and they both stood frozen, staring at each other in awe in that cathedral of trees.

On their last day she splashed in the cold pool behind the dam and toweled herself sassily in front of her boss because she knew he liked to look at her body even if he couldn't do anything with it. A wondrous evening light sneaked through the redwood needles.

"I have a job for you," he said, lighting the coals for a barbecue.

"You just sit down," she smiled. "I'll take care of everything. What do you want me to cook?"

"I meant a job *opening*. One of my places needs a new girl."

"Are you ever nice to me. Where?"

"You might not want it. It's a costume place. It involves playing up to some crazy men."

"What other kind is there?"

"Put this on," he said, giving her a shining package.

She held it out. "Brass bras!" she hooted. "*Mr. Ling*, I didn't know you ran a skin dive."

"Try it on."

Modestly she held it in front of herself. "I'll show through."

"You'll look beautiful, if slightly kinky."

So she stepped into what there was of it. Her hair spilled out of the helmet, a simple brass band around her forehead that supported oval headpieces which might or might not have been earphones. Her breasts spilled out of their immodest cups and her hips spilled out of their hardly adequate metallic banding. "Where do you get your outrageous ideas?"

He took her by the hand into the cabin and pulled his old copies of *Planet Stories* from a shelf. "Treat them like gold. They are from the forties and early fifties and fragile."

Diana shrieked at the cover of an issue he handed her. "That's me! Brass bras and all! And if that monster goes with the job, I'm quitting yesterday! Where is this restaurant?"

"On the spaceport."

Her heart jumped. "How high is that thing?"

"One hundred sixty-five miles."

"In kilometers! I didn't go to school in the dark ages like you."

"Two hundred seventy-five."

"And how high is the moon?"

"Too high for the restaurant business at the moment. They have to make do with a cafeteria."

"Damn," she said. "Don't forget me when you get your first lunar franchise. I'm going to send you vitamin pills every week. I want to make sure

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that you'll live that long."

"You haven't said yes to the spaceport yet."

She squeezed his hand. "When have I ever said no to you? I'm so thrilled I'm speechless. What's the name of your restaurant?"

"*Planet Stories*."

8

For sixty kilometers the raised track swept across the surface of the Imbrian plain. Since the lunar horizon was only three kilometers away, the track stabbed to the edge of the universe like God's knife separating the light from the darkness.

If they were allowed to finish it, within four months graceful ships would be skimming in tangentially at orbital velocity, to be picked up by a travelling platform equipped with superconducting coils, and braked on the maglev track. Right now Byron's staff was installing auxiliary systems, a series of flywheels near the track to soak up the energy of a landing, or feed out energy in the case of a takeoff. A fifteen-ton ship moving at 1680 m/sec and decelerating at two Earth gravities generates 500 megawatts of electricity which has to go somewhere.

The flywheels were housed in huts which could be pressurized during construction and maintenance and evacuated during operation. They rotated on magnetic bearings in a vacuum. Their basic frame was built on Earth but the bulk mass for the wheel was made of lunar laminates. It was those laminates that were giving trouble.

Byron was with one of the flywheel crews when he got a call from the main base. "McDougall. Braithwaite here. Louise hasn't been able to find you. She has an urgent call from Earth."

"Goddamn that phone! I've got enough to do seeing if you and Anne are on schedule and under budget without having to listen to every gripe from Earth."

"Louise said it was a panicky message from Seattle. You're going to be recalled."

"I just got back! Oh for Christ's sake. I suppose they aren't satisfied with the deal I made in Washington. I know damn well it was a stopgap, but it was the best I could do. It has *got* to do for the next four months."

"I think the call was about the crisis," said Braithwaite.

"Which crisis? An old one or a new one?"

"You vac-head. *The revolution*."

"What revolution?"

"In Saudi Arabia."

"Yeah, yeah, Saudi Arabia is going to revolt when hell freezes over. I know those sand eaters. I know Abdul Zamani, the defense minister. I taught him how to fly the F-15."

"Abdul Zamani is dead. The last I heard the refinery complex at Dhahran was in flames. And God alone knows if the new leaders will continue to sell us oil. We don't yet know which freak Marxist heresy they belong to. Old Poker Face raced in from Camp David and seems to be trying to gather support to send in the marines—but hell, it's already way

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too late. The Royalists who were yelling for help are already dead."

"You're kidding me?"

"You didn't scan the news this morning? We saw rows of Royal Bodies hanging headless by their feet from the lampposts in Riyadh. The King was murdered three hours ago."

"My God! And you didn't tell me!"

"I automatically assume you know everything."

"I'm coming in. Sweet Jesus!"

Back in the huts of the main base Byron replayed the late news on his console screen. It had been a stunning coup. The battle was over before the Pentagon had even received orders to organize an airlift. And the CIA had heard the news via CBS. Modern Arab coups evidently weren't the clumsy affairs of yesterday.

Swat, just like that.

He felt disoriented, remembering the tough men he had trained. Those Saudi fighter pilots had been Royalist to the core. He couldn't imagine a coup succeeding without them and he couldn't imagine them siding with the Palestinians and the Pakistanis and the other immigrants who chafed under Royal rule. But he didn't let his disorientation stop him from sensing that here was an extraordinary battlefield situation to be exploited *immediately*.

Zimmerman came into his office with a worried look. "That's bad news. You heard the news?"

"Yeah. I still don't believe it."

"Look, no American should try already to understand an Arab intrigue."

"You sound upset."

"The House of Saud supported *moderate* terrorists. Me, I'm thinking the new government will maybe support *extreme* terrorists."

"I have a simple philosophy about terrorists—shaved ones and unshaved ones," said Byron. "Give any one of them a buck to do in your blood enemies, and they'll use it to buy a gun to do you in for the *rest* of your money. Bank rolling hatred is a risky line of work."

"You think the terrorists are behind the coup?"

"Zimmerman, I haven't got a clue. Money is power and power is a double-edged sword, that's all I know. There is no denying that the Royalists have been feeding murderers. Maybe that money was used to kill Jews, maybe it turned into graft, maybe it flowed backwards to water the plots in Jidda. Who will ever know? Whatever the basis for the coup, somebody just lost a queen in a big chess game. The USA is up the creek. And we on the moon have been dealt an ace." Byron glanced at his watch. "Hungry?"

"It's cucumber salad today," said Zimmerman disconsolately.

"I'm going to have to crack that whip to get that landing track finished so we can ship in some beef."

"With whose money?"

"You think money will be a problem after today?"

"I see a depression," Zimmerman

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said gloomily.

Byron was grinning as they drifted off toward the cafeteria. "I see gas rationing in the States, and I'm dying laughing. I'm seeing the pipes bursting in the middle of winter and I'm rolling in the aisles. I'm seeing the Russians trading weapons for Saudi oil and I'm grinning from ear to ear."

"That bad you see it?"

"I used to like Americans," said Byron with amused savagery. "I'm an American. It used to feel great to go to them and say, 'Here's a solution to a problem that hasn't happened yet.' So how do they react? They sniff daisies. Even my son. Zimmerman, if an American jumps out of an airplane, you can't sell him a parachute until *after* he hits the ground. I don't even flap about it anymore. Americans are manic freaks who slack off suicidally between crises and then work their asses to a bone to meet a crisis *after* it has bashed them in the face—all the time bitching bitterly that no one ever told them that the fist was on the way. Well, *I* told them. *I* was on my knees begging them, for Christ's sake. That's the whole story. It's a mania that will kill us all dead one day, and our Constitution besides, that one last crisis too many, but in the meantime it is no use yammering to deaf ears about how to prevent a coming crisis, you just have to be cool and work quietly until you know exactly what to tell them to do *after* the crisis has them screaming in pain—and hope to God they can get their silly asses in gear as fast as they always have before. Don't have the parachutes ready! Know all about splints!"

"Well done!" exclaimed Zimmerman. "I haven't heard you rant that well for three days."

Braithwaite appeared from behind the potted plants and joined them at their table. "Have you phoned Seattle yet?"

"Why should I call Seattle? I know what they are going to say. They're going to send me back to D.C. to try to sell Congress on putting up the risk capital to set up a production line that will crank out one-ten begawatt solar power satellite per month. I'll go; I'll make salvation noises, and our politicians will stand there with their knees shaking, those George's who have cut us colonials down to the bone, and they'll kiss my ass and they'll buy it. Eight years ago I would have kissed *their* asses."

"You're so happy it depresses me," moped Zimmerman. "The State Department is having a morbid nightmare, and you're happy."

"Give us a smile, Zim."

"How can I give you a smile? My son is in Israel. I'm worried."

"Arabs are killing each other and he's worried. Give us a smile. This is the break we've been praying for. Now the bureaucrats need us in a bad way."

"You really think D.C. is going to buy anything? With our luck they'll revoke our return tickets and turn off the air. We'll starve. Here, maybe have some cucumber salad before it is gone already."

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9

The pods were attached all along the sides of the spaceport. Floating down the central corridor of Pod-43 a customer faced the logo of *Planet Stories* set into a glass rectangle above liquid crystal credits for the waitresses such as:

MOON CRAWLERS
by Diana Grove

Framed by this layout was the control room of a 1940s class rocketship battle cruiser. The busy "captain" could be seen in free fall, perhaps with his hand on the Pressor Beam Rheostat mixing a whisky sour. Beyond him was a porthole and an awesome view of the Earth filling half the sky.

Beside the porthole sat a surly Bug Eyed Monster deep in his cups. He was so lifelike that the unwary frequently approached him to see if they couldn't detect a defect left by the artist and got the shock of their lives. The BEM turned with a cat's suppleness, bared his teeth and snarled at people who came too close. His electronic innards were, of course, made on the spaceport.

Diana was late for work, the first time in many weeks. It wasn't her fault. There had been a minor malfunction on the maglev transport line that carried passengers and freight and empty lighters along the 150-km length of the spaceport. Her apartment, which she shared with another girl employed in large scale integrated microelectronics, was 20 km from *Planet Stories.*

She popped through the airlock entrance—a real emergency airlock—whispered hurried words to the "captain" and scooted to the ladies' room where she slipped into her brass scanties and emerged ready to serve. Serving in free fall was freaky but she already knew how to do it with grace.

"Diana!"

She turned. A man with pepper hair and blue eyes was smiling lazily at her. He wore lunar togs. He had a strong aura about him and she thought she saw in his face a gentle fondness for women. That strange heady feeling of love at first sight struck. She let the emotion tingle through her mainly because he was an older man and that made him safe. Three other men hovered with him at a service booth. She glided over, her willingness to serve at a level above and beyond the call of duty.

"What's a Moon Crawler?" he asked.

"How do you know I'm Diana?"

"I've kissed all the other bylines."

"And they rejected your elever pass so you're trying me as a last resort?"

"Byron," said one of the others, "she's armed."

"And beautiful arms they are," said Byron undiscouraged.

"A Moon Crawler," replied Diana, "is a slimy worm from outer space who telepathically poses as an irresistable woman. All that's left of the man in the morning is his toenails."

"Ouch," said Byron. "Let's hug and make up."

"You wouldn't survive. Now what do you want to order?"

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He was amused. "I'm rich and charming and experienced, a classic winner. What did I do to deserve you?"

At the first opportunity Diana asked the "captain" in his Tri-planet Rocketforce uniform, "Who is that distinguished one with those accountant types? He's a regular here, isn't he?"

"McDougall."

"Thanks. That tells me a lot."

"He has a few interesting stories to tell. He's an old fighter pilot. He's an old Rockwell shuttle pilot. He built half of this bird we're flying on. I think he is a close friend of Arnold." Arnold had designed the spaceport. "He's top dog of the moon base construction crew."

"He's really been to the moon?" Her eyes darted to the corner.

"He *commutes* to the moon."

She leaned conspiratorially over the battle cruiser weapons' control array. "Is he married?"

"Divorced."

She shivered at that news. "He likes me, did you notice?"

"Diana sweetheart, listen to me. You have a superlative bod. He's a make-em and leave-em man. He's out of your class."

"What do *you* know about trapping men!" she flared and left with their dinners.

One thing she liked about her job, the girls were supposed to entertain intellectually as well as serve and be sexy. Ling never sent a woman to *Planet Stories* who wasn't a good conversationalist. It was easy to wedge into this group and dominate the chat. She made her points by touching them lightly with excited hands—except McDougall. She let the men fondle her body—except McDougall. But while his companions caressed her brass armor, she flirted with those flecked blue eyes.

Duties called her away, yet she made special trips back to *his* corner. Only as they finished their after dinner drinks did she tousle Byron's hair and whisper in his ear, "I'm off at 2 A.M. Why don't you pick me up then?" She was trembling with embarrassment.

He smiled. "Too bad I'm not on vacation. This Saudi mess has a stake up all our asses." He scribbled something and handed her a note. "Drop by when you get off. You may have to watch me work."

Diana didn't look at the note until he was gone. It was his Hilton hotel room, the executive suite. She had a flash of anger. *I won't go.* He wanted her to chase him. It was humiliating. *I'll go home and chain myself to the hammock.*

She stared at the wall. On it hung an original *Planet Stories* illustration of the Princess of Io, wearing a World War II hairdo and burlesque costume, racing between the moons of Jupiter on her rocket sled and being pursued. *Some women have all the luck!*

It was a long ride to the Hilton on the maglev. If you were close to the tubes, you could hear the lighters coming in or being shot out, a kind of humming swoosh that came through

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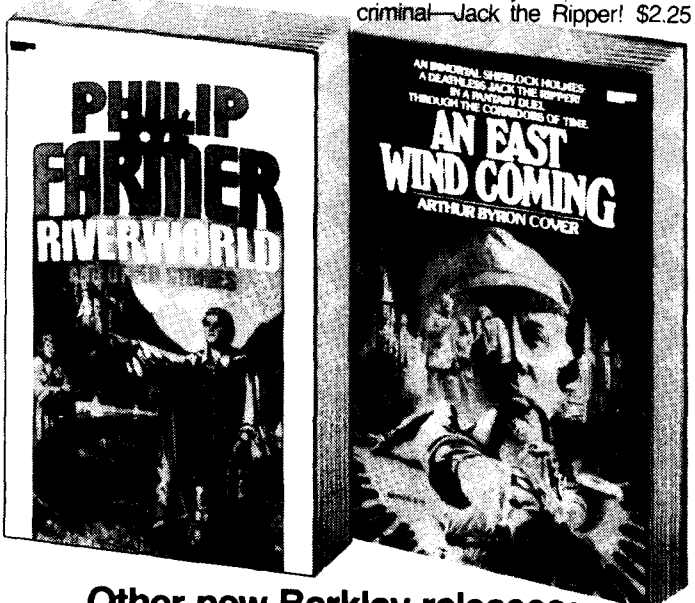

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your feet, but in the maglev bus, suspended in vacuum, you could hear nothing. She did catch an occasional glimpse of an unloaded lighter, its delta wings retracted, moving along the central transport line in electromagnetic suspension where it was being taken to maintenance or loading or to the ejection breech at the leading edge of the spaceport.

Tremulously, at two-thirty, she was at McDougall's door, knocking. He opened. He seemed confused to see her. Behind him papers were maglocked to the walls and the combination info-computer console that went with the executive suite was alive with readout.

"Didn't you invite me?" She clutched his note, unsure of herself on his territory.

He shook himself. "I wasn't expecting you."

"I thought you invited me."

He eased her inside. "And I thought you were pulling my leg. You pulled my leg all evening. So I pulled yours. If I'd known you were serious I would have been after you with roses. I hate being stood up."

Slightly mollified she said, "Where would you get roses in space?"

"There are ways, my little Moon Crawler."

She watched the tension lift from his face. A lined face could not hide tension as easily as a young face. *He's happy to have me.* He took her in his arms and held her warmly. She let him. *What am I doing here? He's going to try to lay me. I've got to get out of here.* "Did I interrupt something?"

"You most certainly did."

"I'm sorry. I won't bother you. I'll just watch. I love to watch men work. They're so involved."

"Give me another hour or so. I'm making up a presentation for a congressional committee. Looking at energy alternatives with Saudi oil knocked out."

"I thought we weren't importing as much oil from Saudi Arabia as we used to." Always get a man to talk about his work.

"We're not. But try turning off 30 percent of your oil supply when you're all geared up for it. That new crew of camel-smelling sister-beaters are throwing out their American oil men and importing Soviet technicians to put their oil fields back into production. They killed more than 20,000 of their own American-trained men in the battle. And we can't do a damn thing about it."

Her eyes were glowing. "Will they have to build solar power satellites now?"

"There's a good chance."

"They'll just dig more coal," she said disdainfully. "Where I used to live in Ohio, everything was done with coal."

He snorted. "Coal has been having problems for a long time. Do you know how many billions of dollars the government spends on coal related disabilities every year? I could buy a lunar colony for that budget." He called up a display on the screen. "And look at that. Hydrogen fusion is still

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3000 times as expensive as fission. That leaves breeder reactors and solar power satellites. And *we* are clean. It will take a mix of both. It is a pain in the ass figuring out the trade-offs. Time is the factor now. We've got to move *fast* and that changes the tradeoffs."

"Is there anything I can do? Sort papers or something?"

"Diana," he said warmly, "you've had a hard day. You've done a whole shift for God's sake. Get to bed. I'll join you later."

"I'd rather watch." With a cringing fascination she watched the terror that was beginning to rise in her.

"And I'd rather see some rosy cheeks in the morning." He took her behind the room screen and pulled out the bed netting and casually began to undress her.

She froze.

He backed off. "We've made different postulates?"

She was panicky. She didn't know how to explain. "I have to be between you and the door. I'm crazy."

He changed positions with her, careful not to touch her, instantly willing to put her at ease. "Is that better?" He was puzzled, and half amused.

She nodded.

"Have you ever made love in space?"

"No."

"You'll enjoy it."

"I'm getting out of here."

"Stay." It was a command. He did not raise his hands.

She stared at those blue eyes which held her, knowing that he would let her go if she had the strength to leave. "I can undress myself." She did so, swiftly, awkwardly, and slipped into the net. "Kiss me goodnight."

Quietly, at six in the morning, he woke her. His body was comfortably warm. That part was like Mr. Ling and she enjoyed it. But Byron's fingers were hungry. That part confused her. She tried to be like the girls in the movies. It didn't work. It was like trying to take control of a runaway horse.

He stopped. "How old did you say you were?"

"Twenty-one."

"You're a virgin."

"Is that bad?"

"Holy Jesus."

"I'm sorry. It's not my fault I was born that way."

"I'm rattled. You aren't in the space I thought you were in, and I'm astonished that I missed it."

"You don't want me?" She was ready to cry.

He didn't stop making love to her, but he was slower and carefully gentle, less intense, more propitiative, and he took contraceptive precautions because he didn't trust her innocence. The pleasure of it astonished her and she clung to him and wouldn't let go.

"My father used to beat me. I've had a hard time liking men. You're a good lover."

"How would you know? I'm a lousy lover."

"You're so delicious that all that's going to be left of you is toenails."

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"Maybe it is just space. The first time you try it on Earth, you'll be shocked—especially if you are stuck with a 200-pound man like me."

"I'm never going back to Earth!"

"I am. In three days."

She began to cry. "Are you going to marry me?"

"Sweet Jesus. I could be your father."

"It doesn't matter. I love you. I remember everything you said. In *Planet Stories* you said you'd never met a woman who could love both you and space. Well, I love you and I love space and I want to settle down on the moon just like you do."

"Wench, we will discuss this later when you are sober."

Diana called up one of the other girls and arranged an exchange of days off. She did her best not to let Byron out of her sight. He didn't seem to mind. She let Byron work. She helped him when she could. But the minute he showed signs of relaxing, she seduced him with every wile she knew. Sex, for two whole days, was her entire universe.

The door slid open. Byron's eyes blazed with blue fire. "Get dressed!" Terrified she slipped into her blouse but his anger couldn't wait and he gathered the collar of the blouse in his fist and shoved her against the wall. "You lied to me!"

She loved him too much to hit him or struggle.

"There is no Diana Grove." He shook her like a dog shakes a rat. "Your name is Osborne and you are sixteen years old. You are jailbait!" He let her go. "Do you realize how much trouble you could get me into?"

"Don't hit me! Don't hit me!" She was cringing.

"You slipped up in some of your stories. I got to thinking. And the company has ways of checking up on people. We can't tolerate fools in space. Sixteen. My God. Sixteen! You should be home with your parents!"

"My father beats me," she said piteously. "That's why I ran away when I was twelve."

Byron remained angry. "Kids always blame their fathers. A favorite sport. Fathers happen to be nice guys. Maybe you just never understood what your father was saying. Maybe you are headstrong and willful and don't see the dangers a father sees. You're young. Fathers know, kid. They *know.*"

Her face twisted into agony. "You don't love me anymore."

A single tear rolled out of his eye. "Jesus, what a damn fool I am. Yes, I love you. And I'm responsible for you. I'm leaving tomorrow and you're coming with me."

Sometimes the sun breaks through the clouds. "You're going to marry me?"

"I'm going to take you home to your family."

The sun can disappear again behind a thundercloud. "I *hate* my father!"

He took Diana in his arms and soothed her. "Can you remember something nice about him?"

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"Why should I?"

"For me."

She paused, wanting to please Byron. "He bought me a rug when I wanted one."

"Did you like the rug?"

"Yeah."

"Remember something else nice."

She thought a long time, her eyes staring off in the direction of Arcturus. "He always made lemon and honey for my mother when she was sick."

"See. He's a nice man. It's been a long time. Our minds don't remember some things well because we are committed to proving that our decisions were right. You'll like him. You'll see."

"Mr. Ling will never forgive me," she said petulantly.

"I'm buying your contract."

"You can't make me go!"

"Oh yes I can," he said grimly.

10

The snow in Ohio was dirty with coal dust. Coal smells were on the air because the wind blew from that direction. Diana was surprised to see her father smiling, surprised to see him contrite, surprised at the warmth of the welcome he gave to the distinguished Mr. McDougall whose power awed him.

She arrived back in her familiar rat warren of factories and dry cleaning stores and chunky houses on tiny lots with potholes in the streets, a prisoner of the man she loved, determined to be emotionless—instead she cried with her mother. Both her parents lavished her with affection.

It was weird to go back to school with kids who hadn't changed since they were twelve because they hadn't done anything since they were twelve. The boys giggled when they said "boobs" and the girls were all virgins who thought SPS was a new thing to put in face cream to keep your pores clean.

Diana introverted into thoughts of Byron, suppressing all the evidence that might tell her she had been abandoned. He had hairs on his chest like Samson and she had some of them in an old perfume bottle. He was a hero angel who built stairways to the stars for men who were as yet too savage to understand. His fingers were pleasure, his eyes an ultimate beauty.

In her loneliness she began a letter to him. She wasn't sure she was going to mail it but the poetry of her love ached on her tongue. "Dearest Byron, I had a dream that there was nothing left of you but toenails and woke up in my bed nude (and beautiful as you well know) and imagined sweet touches...." She redrafted the letter again and again, hiding it under the leather blotter on her desk.

One day when she came home from an errand to buy milk, her father chased her up the stairs raging against the depraved McDougall and against his daughter's dirty pornographic mind. He cornered her in her room, crumpling the letter in his fist.

Karate habits told her to take a defensive posture. She found herself cringing instead but when his arm

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lashed out to hit, her reflexes took over. A precisely placed foot smashed into his elbow, breaking it. She never looked back. She grabbed her Diana Grove papers from hiding and leaped through the window onto the porch roof and down onto the ground, rebounding in a run, unprotected against the winter cold.

A man and his wife found her on the highway, half frozen to death, thumbing a ride. They wrapped her in a car blanket and turned up the heat. She told them she was trying to go to her mother in New Hampshire. Only after she said New Hampshire did she remember that Byron's home was there.

The couple were active Christians and though they gave her endless advice about God and finding Jesus they were also practical. They insisted on taking her home, feeding her and finding winter clothes for her from their friends. They insisted on paying her bus fare and when she protested, they merely smiled and told her she could pay them back by helping someone else someday.

On the bus she prepared the scathing lecture with which she intended to axe murder Byron.

(1) You are a monster!

(2) You seduced me and, not content with just rejecting me, you ruthlessly destroyed the whole wonderful life that I was building up for myself.

(3) And once you smashed my life, you weren't satisfied; you had to deliver me to a sadist for safekeeping, just so you could walk away without any burden.

(4) How am I ever going to get a job like that spaceport job again?

(5) It's not my fault that I had to pretend to be five years older than I really am. The government is stupid. They won't let me work and they won't take care of me.

I'll strangle him. He better give me some money. He better give me a job on the moon.

Halfway to New Hampshire she realized she didn't have a mark on her body and she wouldn't have a story to tell Byron that he would believe. At one of the hour long rest stops she went out to a brick wall and bashed her head against it until the side of her face was bloody and swollen. When some friendly passengers tried to ask her what had happened she queered them by talking up the joys of head pounding.

Looking like an accident victim and in a state of confusion, she stepped off the bus, penniless, at a roadside terminal in a little New Hampshire town. It was madness to think that Byron would be home. He would be in D.C. or Seattle or anywhere but New Hampshire. She was going to a shuttered home buried in snow. His ex-wife, she knew, was in Florida.

She had a cry in the ladies' room before she went over to the post office and asked about Mr. McDougall. The woman told her he wasn't home, but that his son was, and a no good drifter he had for a son. Diana panhandled a quarter for a phone call and when she heard the son's voice, hung up

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without saying a word. She walked in the snow, ten kilometers, until she reached the McDougall place.

A dark haired young man with Byron's blue eyes answered the door. "You've been walking. Your car is stuck? I have a truck."

"No. I'm your father's mistress."

He tried to say seven things in reply and only a squeek came out. She walked past him, hugging herself. He rushed after her. "Hey, you're cold."

"Take me to your radiator."

"You've had an accident."

She touched her face. "The swelling is down. The black eye is pretty awful, isn't it? My old man beat me up for sleeping with your old man."

"My father abandoned you?"

"Yeah."

"Didn't he give you a free year in Paris?"

"He gave me a free year in an Ohio coal town."

"You could have asked for more."

"You don't ask for things when you're in love."

"You're too young for him."

"I *don't* think *that* is *any* of your *business*!"

"Are you pregnant?"

"*No* I'm *not* pregnant," she said through gritted teeth.

"I'll have some hot tea ready in a minute."

She sat down in the kitchen by the radiator and took her boots off. Her feet were white and numb. "Where is he?"

"I just got a check from Houston, but that was a week ago."

"A lot of good that does me." She started to cry.

"Aw, hey now. It can't be that bad."

"If you come over here with your big blue eyes and try to comfort me, I'll slug you!"

11

Diana sulked in the master bedroom except for meals. Across the veranda she had a view of snowed-in farmlands, the kind of rolling landscape rich people purchase when they are bored by the city. The room had a handcrafted look with walnut trim and carved walnut doors. It was wholly a woman's room. Perfume bottles were on display, but things like heavy brass hairbrushes were neatly placed in drawers. Two portraits hung over the bed: a woman lit by sun reflected from spring leaves and a man glooming beneath some autumnal overcast in a fighter pilot uniform. The portrait of Mrs. McDougall, Diana hid under the bed. *His* portrait she launched upon the bed, a raft for a lonely girl to cling to in a king-sized ocean of softness.

Sulking made Diana restless. She had never tried it before and didn't like it. After three days she took a couple of hours off to bake a chicken casserole and that was such a relief she began trying on Mrs. McDougall's clothes, modifying the ones she liked on the sewing machine. A timid knock interrupted her concentration sometime during her fourth day of sewing.

"Like to come to the village? I'm going for groceries."

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"Thank God! Did Byron finally send you more money?"

"Naw. I did some electrical work at the Hodge farm."

"You worked?" she exclaimed incredulously.

"Yeah, you're eating me out of house and home."

"And here I thought I was starving!"

"So today we'll have steak. I figured that if my father can keep *my* girlfriend in Paris, I can at least buy *his* girlfriend a steak."

In the village she noticed that the highway restaurant needed a waitress and she went in and took the job. It was a drag to live with a wastrel like Charlie who ate macaroni every night, sweet as he was. She was used to money.

Sometimes she hitchhiked home after work. Sometimes Charlie was waiting for her if she paid for the gas. Once he arrived to pick her up and found her being hassled by three toughs who wanted to give her a ride. The leader blew smoke in his face.

"You being bothered by these lung disease cases?" he asked.

"Stay out of this, Charlie. I know karate."

"It's not a job for a lady." He assumed the stance of a battle-tried colonel. "Leave!"

They left.

"How did you do that?" She was amazed.

He laughed. "Ordering men around and saving women and children runs in the family. Old military tradition. I'm considered the sissy of the McDougalls."

Diana decided to become independent of Charlie and bought a fifty-dollar car and pay-by-the-week insurance policy after she had wangled some gas ration tickets. The car got her halfway home.

"Charlie," said a plaintive voice over the phone. "I'm stuck on the Stonefield road at the hairpin. Would it be too much trouble for you to come and get me? Bring a chain."

"A chain?"

"To pull my car."

"Your car!"

"I bought a car."

"How much did you pay?"

She muttered an answer.

"Good God! You can't buy an unrusty hubcap for that!"

"It made noises and quit. Can you fix it?"

He sighed. "Maybe it's the spark plugs. I'll be right down."

The engine had seized. "How much does a new engine cost?" she whined.

"Oh, maybe a thousand dollars."

She cried all the way home. He tried to console her by telling her he could get something for the tires, and maybe sell a few other parts but she was unconsolable. He began to feel so sorry for her that the next day he towed the car off to a friend's garage and spent all day doing an engine job. That evening he picked her up.

"Where's the truck?"

"I brought the car."

"I didn't know you could fix cars."

"I can't but I used to repair ob-

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solete jet engines at MIT."

"Where did you get the money for parts?"

Charlie grinned like a man who has just won somebody else's gambling money. "My father is a millionaire. I have a kind of credit around here. He grumbles like hell, but he pays the bills."

"I don't understand you. Why do you loaf around when you could get a job as a mechanic?"

"Diana! That's work! I only did it for you."

"You're my nice sweetie pie. How can I sacrifice myself for you?"

"Entertain me in bed."

"I belong to your father!" she said indignantly.

"What kind of garbage is that?" he snarled.

"A girl belongs to the man who took her virginity."

He groaned. "You believe that drivel?"

"I certainly do!"

"You sound like my grandfather."

"Are you in love with me?" she asked warily.

"An inch, going on an inch and a quarter."

As they were thrown around the hairpin turn on Stonefield Road she kissed him. "If I hadn't met your father first, I'd love you an inch and a quarter, too." She kissed him again.

"Watch that stuff. You'll get dirty. I couldn't wash all the grease off."

"I don't care. I want to be nice to you. What was the nicest thing that ever happened to you—besides sex?"

"When Betty let me give her a bath."

Diana screeched. "I'll give you a bath!"

She sudsed him carefully, in no hurry to finish caressing away the black grease. It made her lonely to touch him, and happy at the same time. He tried to convince her to join him in the tub but she refused. When she was toweling him afterwards, he tried to kiss her and she hit him and they had a fight. She ran to the master bedroom and locked the door but hugging Byron's angular portrait proved to be no way to go to sleep. She kept thinking about crazy Charlie.

At four in the morning she wrapped a sheet around her body and shuffled to the kitchen for a glass of milk. She returned by way of Charlie's study, curiosity driving her to rifle through his papers. It was mostly schoolwork—equations, printouts, drawings, projects, experiments.

Charlie appeared at the door in his pajamas. "You're not asleep." He paused. "I'm sorry."

"I'm not mad at you. What are all those things?"

"I used to go to MIT."

"What are you?"

"A lunar engineer. It's not that really; I didn't specialize in lunar construction problems until my last year."

"Is that what these diagrams are?"

"Yeah."

"You never told me."

"It's not important to me."

Like a dash of hot tobasco the old

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excitement was in her body as it sauced her blood with adrenalin and a pinch of lust. "Did you flunk?"

"I was the top of my class."

"Why aren't you building houses on the moon? It would be fun."

"Fun? It would be like New Hampshire in January with the air missing. Why take the moon when the worst that can happen to you on Earth is to be staked to an anthill in Nevada."

"But you could go if you wanted?"

"My father would love it. Staking me to an anthill isn't good enough for him."

A small adjustment of her shoulders let one curious nipple peek over the sheet at his blue eyes. "And what's all that electronic junk?"

"My music."

"Is that the weird stuff I hear once in awhile?"

"No, the weird stuff is when I'm composing. That's just experiments and subthemes. Sometimes it's a foundation sound on which I'm going to build." Then he added shyly, "I've been composing a piece for you."

"Oh, you *are* in love with me!" she teased. "May I hear it?"

"You sing this wild stuff in the shower. I built it on that. You'll have to forgive me for bugging your shower."

"But I have a slug's voice!"

"Ah, but it's all filtered through my electronic ears and I hear the most beautiful things when I listen to you."

"If you weren't so lazy you could work as a queen's flatterer."

"It's called 'Diana in the Rain.'"

Nothing larval was left in the voice he had transformed with his silken touch. Mostly it wasn't even human. Perhaps a nymph bathing in a mountain waterfall would sing that way. The sound folded and unfolded wings of joy so startling even she failed to recognize herself as the music gripped her with her own emotion. Background instruments fluted in tonal patterns no wooden instrument had ever emitted. Her mind, captured by his net, remembered mythical worlds she had never seen.

He stood breathless, anxious, watching her reaction. Slowly becoming aware of what his metamorphic magic had done to her, she worked out of her percale cocoon with little jerking cries of pleased embarrassment.

"Golly."

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He was drugged with happiness, just watching her.

"Don't stare at me like that or I'll turn you into a stag and your own hounds will hunt you down!"

Gently he carried her off to bed but, when responding to his memory of her earlier anger, he withdrew, she would not let him go. What is true one hour is false the next.

"Stay with me and cuddle. As long as I get the door side of the bed. You can make love to me in the morning."

When she woke she found him staring at her with his blue eyes. She rubbed noses with him. "Hi," he said. "Is it morning yet?"

Their sexing was an awkward disaster. The gravity threw her off and he was a virgin. Alternately they swore at each other and laughed. Finally they decided that at least they knew how to hug.

"It reminds me of a story that my grandfather loves to tell," he sighed. "Once upon a time there was a new recruit for the 43rd Cavalry Regiment and the commanding officer asked him, 'Have you ever ridden before, my boy?' 'No, sir,' said the boy. 'Hmm,' replied the colonel, 'I have just the horse for you; she's never been ridden before, either.'"

"Let's have breakfast and try it again," she said.

For three days Diana ran around in a daze, baking, washing his clothes, laughing at his jokes, buying him presents with her tip money and hugging him every time she met him. The second time she found herself scrubbing the kitchen floor in one week, she frowned. Did sex always make a woman feel this way? Byron had given her goosebumps, too. Were men similarly affected? She peeked out the kitchen window and saw Charlie freezing his fingers off changing a bearing on her right front wheel and that was reassuring.

By Friday she was enough in control of her emotions to begin the Great Plan. (1) Get Charlie a job. (2) Get him to finish school. (3) Get him a job on the moon. (4) Marry him. (5) Have children. She wasn't going to do it by nagging. She hated nagging a man. She'd rather leave a man than nag him. She was going to do it by worshipping him when he moved in the right direction and with patience and humor.

A driver's mother died and he trucked potatoes for three days; Diana let him make love to her for three evenings and three mornings. A neighbor's pipes froze and he joined the plumbing crew; she cooked him a four course meal. Slyly she began to encourage him to be more ambitious. He took a weekend gig in Concord with his music. But spring came and he was still only doing odd jobs. Happiness gave her patience. They went walking in the woods when the buds sprouted. They splashed nude in the ice cold brook.

She began to read to him from the papers about the big new push into space. Money was flooding into the effort. Overnight the high frontier had become a business almost half as

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big as the American cigaret, dope, and cosmetics trade. Charlie was never interested. She hid her hurt.

The Saudi Arabian situation improved. Escaped Royalists had money in America and Europe with which to influence politics at home. Intrigues prospered. Assassinations were frequent. The new leaders found it easier to conquer than to rule, and found some appeasement of the western capitalists necessary. Still the oil situation was grim and as reserves were depleted the United States imposed draconian gasoline rationing. Syntigas plants were pushed to full capacity in spite of a coal strike, suppressed by the Army. But sabotage continued to decimate coal tonnage.

Red tape was cut so that breeder reactors could be put on line in four years but nuisance protests continued to mount. A new tar sands plant was financed for Alberta. Hydrogen fusion power was brought down to $100 per kilowatt hour. A new gas field was discovered at great depth in the Gulf of Mexico. Mainly the economy was gearing up for solar power satellite production.

She read to Charlie the fabulous job offers in the *New York Times.* He wasn't interested. She sulked.

One day like a bolt from Jupiter the father called and Diana listened on the upstairs phone, tears rolling out of her eyes. *There* was a man. He could build. He could fight. His very voice called forth loyalty. He was on the cover of *Time* magazine. He could even be tender to virgins. His kind forged the glory of man. She ached to hold him. Could a woman ever forget her first man?

That noon Diana cooked pies and a mouth watering lasagna. She made a fresh spring salad of new asparagus tips. She adjusted Charlie's collar. She teased him and in all ways was free and easy with her love. When she went to work she left a note in the truck's windshield wiper. "I have a job on the moon." Which wasn't true. "I'll *always* love you." Which was true for the moment. "Keep in touch."

She stopped at the restaurant only long enough to collect her pay and buy a packet of black market gas stamps which got her as far as Montana. In Butte she abandoned the car and took a bus to Seattle, curled over two seats with her head pressed against her wadded jacket, dreaming that she was asleep next to Byron's facial stubble.

12

For three hours a nervous girl waited in the hotel lobby where that flighty secretary said he was staying. It stunned her when he sailed by, his weathered eyes scanning over her like a reef to be avoided, his wake washing away the hello in her throat. She buttoned the décolleté she had arranged to remind him of her womanhood, and followed him into the waiting elevator, ignoring him while they touched shoulders.

He left the elevator. She followed silently. He stopped and took out his key card. She waited.

"Diana! For the love of God!"

"So you finally noticed," she said

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petulantly.

"I had you pegged as one of the convention girls," he apologized, somewhat untactfully, switching on the light and walking over to the telephone. "What'll I order for you?"

"Poison darts!"

He spoke into the phone. "A double whisky for room 412. Also an extra glass, a bucket of ice and three bottles of ginger ale." Carefully he cradled the receiver. "So you ran away again?"

"He beat me up the minute you left! I mistook myself for a gong. I escaped by jumping two stories into the snow. A couple of good samaritans found me frozen to death at the end of a trail of blood. I learned about fathers what I already knew."

He was gazing at her with quizzical amusement. "Any scars?"

"No sir!" She snapped her heels. "Regrouped, resupplied, rested, and ready for active duty, you son-of-a-bitch, sir!" A clipped salute finished her report.

"*Now* I remember you," he said amiably. "And how have you been spending your AWOL?"

"Living with your son."

His face crumpled like a piece of paper being prepared for a bureaucrat's wastebasket. "You've seen Charlie?"

"We're lovers."

"Did he send you here for money?"

"Oh Byron! I heard your voice last week on the phone. I became nostalgic. I came here to marry you. We're going to have three children and live on the moon."

"A minute ago you were ready to kill me with poison darts."

"That was a minute ago. I'd be a good wife."

"I'm tempted," he said.

"Yeah?" She unbuttoned her décolleté.

"But my good sense remains. I'll give you a choice. I'll argue with you or I'll send you to an orphan asylum."

"Argue with me."

"You laid Charlie, eh?"

"What's it to you! The last I heard from you, just before you abandoned me to that prick father of mine, you wanted me to live in the coal dust and be virtuous."

Byron was trying to visualize being married to her. "I was thinking that you are young, even for Charlie."

"Yaah! Charlie's young, even for me."

"It wouldn't work between you and me," he said decisively.

"Why not!"

"I'm more than thirty years older than you are. I'm dying. You are beginning to flower."

She undid another button and rummaged around under the bed for his dirty socks which she angrily threw into a plastic bag. "Corpses make good fertilizer for flowers. Your power and my youth; it's a fair exchange. Jesus, Byron," she turned to him with regret, "I swooned when I saw you on *Time*. I was horny for a day."

"You'd tire of an old man."

"But it's *men* who are fickle.

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Women aren't like that. They're faithful. When they love a man, they *love* him. I'd be faithful to you. I'd forgive you anything."

He was settling into his decision. "That's what they all say when they are seventeen. When they are twenty-seven it's a different story."

"Already you're complaining about ten glorious years?" she stormed. "I'll bet you think you deserve fifty!"

There was a polite knock on the door.

"Young girls tend to bore experienced men," he reminded her.

She flung open the door and took the double whisky from the bellhop's cart before he had fully entered the room. She set the glass on the dresser, imperiously tipped the man, and poured Byron a ginger ale. "For your liver, old man. So I bore you, do I?"

"You started me thinking about those fifty years."

She half finished the whisky in one slurp.

"Can't I even have a sip of my whisky?" he complained.

"I've decided to blackmail you instead of marry you," she answered calmly.

"Blackmail me!" She had his attention. "We're not even married yet and you're being a bitch. I hope your lawyers are cheaper than my lawyers! You've stolen my whisky. What else do you want?"

"A job on the moon."

His humor left him. "No. That's final. What's your countermove?"

"You damn fool!" she flared. "Your son is in love with me! He'll follow me to the moon! That's where you want him!"

"And do you love Charlie?"

"No! I can't *stand* drifters. Yes. He's very kind."

Byron gripped her arms in the iron curl of his fingers. "Diana. He *won't* follow you to the moon."

"Yes."

"*No.* I know my son."

"You've seen him lately with my legs around him?" she lilted sarcastically, not even trying to escape his crushing hold. "I've watched him butter my toast. I've watched him scatter men who were trying to molest me. I've seen his eyes in the morning. You know *nothing* about your son. You're a dried up old man, remember, who has forgotten what it's like to be driven by his juices. Charlie would follow me to hell. I planned it that way." She started to cry. "At least he will if we move fast enough before he has time to sober up and get another girl."

"He could follow you and refuse to work."

"Then I'd let him die. No man of mine is a suck." She smiled through her tears. "But for me he'd work. He's a sweet guy, Byron."

He began to march around the room, shaking ice from the ginger ale glass he had exchanged for her arm. "And you think I give a *damn* whether he goes to space? I don't give a *damn* anymore. I used to care. Now I'd be happy if he did anything. *Anything*.

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Wash cars even. How is his *damned* music going?"

"Like his engineering. He piddles at it."

"Is he healthy?"

"He's fine. I took good care of him. He's probably very unhappy right now."

"Suffering, eh?" Byron was smiling again. "A couple of months in the trenches will do him good. Finish your whisky and let's go. You've earned a dinner in Seattle's only real French restaurant."

At dinner he refused to gossip about his son. He ordered the best meal on the menu, the third most expensive. "It's good to eat like this again. For awhile I didn't even have an expense account."

"I'm on your expense account?"

"You're goddamned right. This year the Saudi Arabian Royal family lucked out and I'm enjoying every minute of their agony. We're tripling the size of the lunar colony. I wouldn't have believed that last year. And you should see the assembly line we're setting up for the solar power satellites; subcontracts all over the nation. It is going to be a boom year for the economy even though oil is short."

Her eyes were grinning. "I heard rumors that next year hydrogen fusion prices will drop to one cent a kilowatt hour."

Byron almost didn't laugh. "How could I let my son marry a girl with such a macabre sense of humor?"

He took her walking along the night beach, barefoot, sometimes on the sand, sometimes over the great driftwood trees, his shoes tied by the shoelaces over his shoulder and hers stuffed in his jacket pockets. The Pacific wind was cold and she sheltered herself behind his body, wondering at his silence that lasted for miles, not daring to invade his thoughts. The waves came and broke and went. Their feet were alternately drowned by foam and then free to make wet tracks in the moonlit sand.

"I'm not sure you'd like it up there. There is no moon in the sky for lovers."

"We can make poems about the Earth."

"You still have your Diana Grove papers?"

"Sure."

"They need to be made more solid. I'll spend some money."

She hugged his arm, thanking him silently, the glory and the triumph rising in her bosom to shout down the Pacific wind.

"I'm shipping out in two weeks. I'll take you with me. Not because of Charlie. Charlie can go to hell. For you. If Charlie follows, well, there'll be a job for him. We're building a second electromagnetic track to separate the take-offs from the landings."

Blackmail works! She was amazed. "What will I be doing?"

"Who knows."

"May I stay with you tonight?"

"No!"

"My hotel by the bus station has cockroaches!"

They were halfway back along the

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beach before he answered. "Zimmerman tells this story about some New York cockroaches that followed him to the moon. He claims to have spaced them and that they didn't die but are running around the crater Aristarchus to this day."

13

Rockets were still used to carry passengers and large freight to orbit. The electromagnetic interaction of a vehicle and the spaceport involved momentum transfer and large lighters would have required a more massive spaceport. Since the material of the original spaceport had to be carried to orbit by rocket, cost demanded that, once built, it would be supplied by a swarm of midget freighters which were intrinsically unsuitable for passenger transport.

Diana felt like a veteran. A mere year ago she had first been thrown into space by a rattletrap Rockwell Mark VI transport, a much modified version of the original Rockwell shuttle but still launched essentially by the means pioneered during the 1980s. Today she was aboard a modern impact rocket fresh from the factory at San Diego, its very design younger than her "Grove" identity. Even the upholstery smelled clean.

"How do you like this imp?" asked Byron cramped beside her, not a patch of their bodies unsupported. Imp was the name by which impact rockets had become known.

"It's super."

"You're not scared?"

"I'm going to heaven!"

"I'm scared to death. I get nervous out of the cockpit."

There were no stewardesses. A robot seat monitored each passenger, checking that regulations were complied with during the countdown. "...three...two...one..."

Blast off crushed them. The imp was, among other things, an oxygen-hydrogen rocket of mass ratio four, carrying enough propellant to reach slightly more than half orbital velocity. The roar cut off. A button tumbled in free fall in front of Diana. Then, as the imp found the apogee of its orbit among the blaze of stars, they met the spaceport, an express to hell passing under them so fast that its linear bulk was already perspective lines piercing infinity at the very moment the four gravity acceleration hit them.

The imp's magnetically suspended arms had reached down and were receiving oxygen from precision valved nozzles set into a perfectly straight feed pipe laid along the spaceport. The oxygen was hurtling at circular velocity as it entered the imp's ducts. The gas suffered an almost elastic collision against the vehicle, swinging through the ducts, around and out the rear jets with its relative velocity reversed—thus violently thrusting the ship forward without affecting the momentum of the spaceport at all. As the imp began to catch up with the spaceport the impacting oxygen became less and less effective. Then the imp began to inject hydrogen into the reaction chamber, adding fire to the recoil.

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Ten percent of the oxygen used by this impact system was already being supplied by the moon. Eventually all of it would be. In the meantime oxygen was imported from the Earth via the hybrid lighters.

"Poor little Byron, you can relax now. We're here."

"Whew! The old shuttle was a piece of cake compared with this sobering ride. I feel like I've just been put up in front of a firing squad and asked to gently kiss a machine gun burst."

"You're such a stick-in-the-mud. You're too old for me."

They ate at the *Planet Stories* with leisurely gusto. Diana got drunk for the first time in her life. She told Shaggy Dog jokes and, when she had the attention of five booths, tried to dance on the tabletop. If you've ever seen a drunk try to dance on a tabletop in null gravity you may understand the extent to which laughing tears convulsed her audience. When she passed out, Byron towed her back to the Hilton.

The next day they caught a ferry to geosynchronous orbit at the construction site of the first ten begawatt solar power satellite. For eleven hours the five passengers played poker while the captain distributed sandwiches and made coffee.

There was some more ship maneuvering. When they went into a parking orbit, the captain called Diana into the cockpit. "Take a look." The matchstick framework of the SPS angled away into the star laden blackness. "It's hard to comprehend how immense it is. Look, see that crane over there? It's a whopping big crane. See the little dot? That's the cabin for two men."

"Wow."

"I'll give you the grand picture. That thing is going to be as big as Manhattan Island. What you see is only five of the eight modules. What's out there would reach from Battery Park to 110th Street at the end of Central Park. The next module, the one that would contain Columbia University off in one corner if it was a piece of New York City is being assembled in low orbit right now. They bring them up here by pushing hydrogen through porous electrically heated tungsten to get it through the Van Allen belts quickly, and then the rest of the way with ion jets."

McDougall was laughing behind them. "Tell her how to get from the A-train to the Seventh Avenue line."

Within the hour they docked with a lunar lander and exchanged lunar oxygen for terran hydrogen. The captain of the lunar lander stuck his head through the hatch, mainly to get a chance to razz McDougall. Byron didn't introduce him to Diana until the visit was over.

"Maltby and I used to fly in Saudi Arabia under the same command. He'll be taking care of you from here in. But don't depend on him. He's a rascal. Take care of yourself. Write Charlie. And don't let them send your bags to Mexico City. Ciao."

Maltby took her back through the tunnel.

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"You sit copilot with me."

"Where's your copilot?"

"He's too fat. I left him home. Where would I put you if he was here? This ain't no taxicab. This here boat is a freighter. You want to fly the beast?"

"You're scaring me."

"It seems complicated to you? Shucks, you just say 'giddiap' and the beast goes. She has a brain of her own. She knows where home is. The smell of oats."

"Giddiap," said Diana. Nothing happened.

Maltby did a few quick things with his fingers and the ship swung around. Then he yelled "Giddiap!" with an ear piercing Texas drawl and the ship roared to life.

This trip, instead of poker, she learned how to play chess. He gave her a two-pawn-and-a-rook handicap and she won one out of five games in the next three days.

The ship faced backwards for the horizontal landing, its rockets firing in tiny vernier adjustments. Lazily the barren moon flowed by, slowly rising to meet them. Only when they were skimming the plain at crater-rim height did their speed become evident. A mile every second. Nearby features ran together in a watercolor blur. Suddenly the track appeared beneath them and she saw, for a split second, the rocket-catching-cradle racing up the track toward them. She remembered the spaniel who used to gallop from the neighbor's house to chase her bicycle. The cradle positioned itself underneath them, grabbing with gentle jaws until their ship and the maglev vehicle became one.

Maltby was yelling "Whoa!" at the blood curdling top of his Texan voice. Electromagnetic fields cut in to convert fifteen tons of mass flow into an electron flood. Force hit then, two gravities that slowly built to five. The blur beyond the windows resolved into the majesty of the lunar desert, and finally they were moving sedately along a shunt line towards a shed. Maltby was fondly patting the control panel, smiling. "Atta girl."

I'm here, she thought and wonder was all within her.

She was assigned to the hydroponic gardens under a scowling beak-nosed boss who went through his chambers constantly tasting tomatoes and carrots and brocolli like a Punch making passes at lady puppets.

"Now that's a strawberry," he cackled. "I have the little buggers fooled that they are living on the slopes of a British Columbian mountain. Taste is everything. To hell with yield. Yield we can leave to the Californians." Slowly his grin grew, showing his upper gums above his jagged teeth.

She decided that her boss was crazy—not that what he *said* was crazy, but he had papered the wall of the small strawberry room with a fantastic view of a British Columbian valley. It didn't take her long to find out that everyone else was crazy, too. In the cafeteria with the construction workers she listened curiously to a

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conversation beside her. Billy was sick. He'd been anemic for months. His leaves were drying around the edges. *His leaves?*

Byron's friend, Zimmerman, dropped around after work to play scrabble. Diana asked him, "What kind of fruitcake would name a lemon tree Billy?"

Zimmerman nodded. "I hear Billy is pretty sick about it, too. My tree, I named Hershel Ostropolier and he's never been sick a day in his life."

Then there was the tiny cook who had a redwood tree called Paul Bunyan. Weird. But he was into Bonsai so Diana supposed it might be all right. When she bought her own baby orange tree she decided it was *not* going to have a name, however, one evening in a humorous mood when the conversation came around to the Celtic worship of trees, she toasted her tree with a local version of Irish Mist. "To my true Irish friend!" Henceforth her orange tree was invariably referred to as "the Irishman."

It wasn't easy living on the moon. The corridors were cramped. The rooms were small. There was no place to go. She missed Charlie and hiking through the New Hampshire woods.

Worse, an enormous sense of loss began to plague her. She had no direction, no purpose to her life which had always known a fierce purpose. It was awful. It was like being a compass that had smashed its way through to the north magnetic pole and was now spinning, aimless. One night she dreamed about the truck driver who had taken her to Washington when she was twelve. In the dream he said with an ironic smile, "Better be careful what you want, kid—you may get it!"

Somehow the most important thing in her life became the study of plants. She was going to become a genius and bring life to the moon. She borrowed botany books and began to memorize all the names. She began to read biology books and agricultural texts and every hydroponic book in the library of her boss. Studying became an urgent compulsion. There wasn't even time to socialize, and finally no time to sleep.

One afternoon, looking for a scrabble game, Zimmerman found her wandering around the landing track control room trying to explain a theory of hers that no one could understand.

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Every time when she woke up and tried to get out of bed so she could go back to work, they held her down and shot her full of drugs again. Once she escaped and turned up for work in her pajamas. They brought her back and put her to sleep. This time she was going to be more cunning. She'd pretend to be asleep until the drugs were all worn off and *then* she'd get up and go to work.

She peeked.

"Ah, you're awake," said Charlie.

She opened her eyes in wide disbelief. "Charlie! What are you doing here?"

"The old man called me up. He told

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me to get off my ass and take care of you. It was like listening to a wire brush cleaning out the hole between my ears."

"Are you on *their* side?"

"I don't know from nothing. I got here an hour ago. Tomorrow I'm out working on the new track. The old man got me a job as a laborer, the rat."

"Get me out of here, Charlie. I have to go back to work."

"You're on a paid vacation and you're complaining?"

"They'll fire me." She was terrified.

"Nobody is going to fire you with my old man backing you."

"What happened to me? They won't tell me."

"You were wandering around passionately trying to convince people that milkweed was going to save the moon. The flowers are edible or something."

"I wasn't! I don't believe you!" She hid under her covers in shame.

"Yeah, you were really around the bend."

"I don't understand," she said through the covers.

"Neither does the doctor. But I do. You ought to see the loonies wandering around MIT during final exam time."

"You'll take care of me?"

"Do you think I'll let you out of my sight again? You gave me the shock of my life. For a week I thought I was strong enough to dismiss you. Then a funny thing began to happen. The sweet flowered fields of New Hampshire dissolved away into the flowered fields of hell. And the moon up there in the sky began to take on a heavenly beauty."

"Can I go back to work? I could finish the afternoon shift if I started now."

"Maybe tomorrow. We have to settle things between us. Like who is this Irishman you're living with?"

"That's not my Irishman! That's my orange tree!"

"I'm competing with an orange tree? Do you think I have a chance?"

She laughed as Charlie tried to walk her home. He needed low gravity locomotion lessons. Once he collided with one of the awkwardly placed potted trees. "Charlie! Excuse yourself to Jezebel." He looked at her askance as she patted the pear tree. "There, there, Jezebel. Everything is going to be all right." Then she burst into tears.

Select friends gave Diana a homecoming party. Her boss arrived with a bowl of strawberries so delicious they needed neither sugar nor cream. Zimmerman leaned against the wall stealing more than his share. Louise was there and Maltby brought his guitar and his regular copilot. The Irishman moved into one corner to make room for them all.

Later Charlie explained to her the profounder truths of the universe as he saw them. "Some unsolved problem starts to push you. A couple of weeks without sleep and the borderline between the real world and im-

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agination begins to fuzz. You fall asleep on your feet. You begin to treat real people as if they were the ghosts of your dreams and that's when the guys in the white coats come after you. Happens all the time at MIT in May. So if you get eight hours of sleep, I'll let you go to work. Otherwise, no."

"Make love to me. That'll put me to sleep."

"Thanks."

"Is that what happened to you at MIT?"

"Naw. I was pushing to get my father's ass. Sweet revenge. Haven't you ever wanted to strangle your father?"

"Oh yes!" she said brightly.

"I was going to get 100 percent in every course my last year just to rub that martinet's nose in the robot he'd made out of me. But no matter how much I strove I just couldn't make it as a robot. I couldn't get past 98 percent. It drove me crazy. It was like continually jumping in front of my father's Buick to prove to him what a bad driver he was and always coming out between the wheels without a scratch."

"You're crazier than I am!"

"I owe it all to my father." He was smiling.

"I like Byron!"

"That's because you're a girl." He sighed. "Maybe one of these days I'll make my peace with the old prick."

"You could have finished school. It

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was in your own best interest."

He shrugged. "I wasn't doing it for me."

"Why didn't you do more with your music?"

"My music was something they *didn't* want, so it was a reaction, too, I guess."

"What *do* you want then?"

"You."

"Oh Charlie! That's not enough and you know it!"

"Maybe it is. Men are more romantic than women. Women only pretend to be romantic because they know men like it."

"Are you calling me a fake?" she bridled.

"No. You made it very clear that what you wanted to do was sit on a peak 380,000 kilometers high and look down on the rest of us."

"Screw you!" She strode to the furthest corner of the room, which wasn't very far away, and sat with her arms crossed, confronting him belligerently.

"Don't you think it's romantic that I climbed a peak that high just to ask you to marry me?"

She smiled mischievously, still with her arms crossed. "You haven't passed the other tests yet. You have to learn how to work first. Then *maybe* I'll marry you."

Within two years Charlie worked his way to assistant chief construction engineer. He was known with awe as the 100 percent man; the man who got the job perfect the first time. He lived with Diana and refused to take an SPS construction job because it would take him away from her.

Diana began to write papers on taste in high yield crops. For a lark she sent some tomatoes to a California fair and won first prize. She had seven projects going at once. Some people suspected that she never slept. Then, when necessity moved the command center out of the original Spartan dig-

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gings into much larger quarters, Diana made some frantic calls to Byron before someone else could find a use for the space. Charlie did the conversion design work. Zimmerman did the politicking. Ling, her old friend Ling, put up the money.

The place is called *Diana's Grove.* There are trees everywhere, not big trees, but what they lack in size they make up for in lushness. Some of them bear fruit—lemons and oranges and figs. There are vines and bamboo stands, even a brook that flows in too dreamlike a manner to gurgle. The benches are real wood. The food is the best in the solar system—just don't ask for beef. Nymphs with names like Callisto serve the tables wearing Roman hairdos and whispy gowns.

Diana, when she comes, makes her appearance in a white tunic with quiver over her shoulder. She knows everyone. Often she has a dinner party in one of the alcoves and brings people together who should be together, sometimes for major or minor politicking, sometimes because she delights in the clash of disparate views, sometimes because she is a secret matchmaker, sometimes for trivial reasons—an old professor of Charlie's needs company or one of her friends needs to discuss curtains. She is fiercely protective of the girls who work for her.

If you've ever heard the music at *Diana's Grove* you know that Charlie has risen into the league of the greatest. He claims it is just a hobby. The compositions can be as simple as birds chattering in the morning from somewhere beyond the leaves—a heron's cry, a sightseeing flock southbound, a lone warbler—or it can be a conversation stopping argument between the gods.

Infrequently Charlie still proposes to Diana. She smiles her teasing smile, even though they already have one child, and writes him out a new contract in a flourishing script that promises she will be faithful to him for at least the next fortnight. He grumbles that living with her is like being an untenured professor.

The solar power satellites are winking on all around the equator, half of their mass coming from the moon now. All of the oxygen used by the space fleet is manufactured on the moon. America is prosperous, doing what it has always done best, selling high technology to the rest of the world. Her economy has achieved power independence and resource independence. The investment is considerable but it is, as yet, not well defended. Both McDougalls belong to an unofficial defense ministry which considers problems that Pentagon thinking is too archaic to handle. Serious decisions have to be made to secure the high ground in the face of a Russian resurgence into space. Such duties take Charlie back to the homeworld once a year.

Diana never goes with him. She is a minor Earth deity who worked hard for her promotion to moon goddess and she is well content with her position. ■

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Part II the spaceport

Building Energy Cheap Space Transportation

Suitably used, an orbiting spaceport could do far more than pay for itself.

by **Roger Arnold** and **Donald Kingsbury**

SPACEFLIGHT AND ENERGY

Those who saw the Saturn booster lift-off for the moon were awed, and even shaken, by the river of energy that flowed from the nozzles of those five F1 motors as they moved that sky-scraper up off the Earth. That was 42,000 blazing megawatts of power, the equivalent of half of the electrical power being generated by the United States at the time. The Earth trembled.

Since then people have had a gut feeling that it takes *power* to get into space, that spaceflight is an *energy* intensive business too expensive for an energy poor nation like the United States to undertake on a mass scale. That gut feeling, like most gut feelings based on too little experience, is wrong.

(1) Recall the story of the gnome at the bottom of his well who tricked the elf at the top into stepping into the well bucket. While the elf rode the bucket down, the gnome got an energy free ride up out of the well.

(2) Hans Moravec delivered a paper at the twenty-third annual American Astronautical Society meeting in San Francisco titled "A Non-synchronous Orbital Skyhook," which described an energy free way of reaching space. A rimless wheel with spokes "rolls" around a planet, its hub in orbit. If the cage at the end of a spoke brings down as much mass as its counterpart lifts out, we have a "space elevator" that requires no energy input. For Earth such a "wheel" demands materials of greater strength than is practically possible, though of less strength than is theoretically attainable. For Mars or the moon, present day materials would permit us to build such a device.

(3) In last month's Analog we described a method of reaching space which requires substantially less

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energy than the brute force rocket approach. An orbiting spaceport, long and massive, acts as a momentum bank. Small and single-stage rocket-propelled vehicles called "lighters" are launched from the Earth at sub-orbital velocity and captured by the spaceport electromagnetically. The momentum exchange between the two slows the spaceport slightly as it drags the lighter into orbit. Later the spaceport regains its lost momentum by electromagnetically shooting the same lighter back to the Earth at high velocity. If the spaceport ejects from its stern as much mass as is being received by its prow, the energy requirements of the parallel mass drivers are small. However, if the lighters leave their payloads in orbit and return empty, the spaceport, to remain in orbit, must have access to a sizeable energy source.

So that we might have a model to generate numbers for us we conceived the spaceport to be a reedlike structure 150 kilometers long containing electromagnetic muscles and electrical senses providing an artificial lateral rigidity and a controlled longitudinal flexibility. The spaceport moved in a 90 minute orbit, 275 kilometers above the Earth's surface at a velocity of 7740 m/sec. Our mass estimate for the spaceport was 50,000 tons plus solar energy generators at 16 tons per operational megawatt.

The Earth-to-spaceport lighters were assumed to have a gross-lift-off-weight of five tons—four tons of oxygen/kerosene propellant, half a ton of dry mass and a half a ton payload—meeting the spaceport at half orbital velocity, 3870 m/sec, and being electromagnetically accelerated at five g's. Maximum delivery rate was assumed to be one lighter per second.

One can question the design presented on various points. Others working with mass drivers have routinely designed for accelerations 100 times greater than the 5 g's we assumed. We chose an exceptionally conservative figure because we found that total spaceport mass was largely independent of the acceleration used. Higher accelerations made for a shorter spaceport, but required an offsetting increase in its mass per unit length to handle the greater forces and power levels. The low acceleration allowed us to minimize the non-payload mass of the lighter. But perhaps a shorter spaceport would be desirable for reducing atmospheric drag. (There are still some traces of atmosphere even at 275 km, as the recent demise of Skylab illustrates.)

Of greater significance is that we may have grossly overestimated the ratio of spaceport mass to lighter payload mass. Designs using homopolar generator-motors (see figure 1) in place of capacitors for energy buffering can apparently reduce by a factor of ten or better the spaceport mass required to accommodate payloads of a given size—or conversely to allow a spaceport of the same mass to handle payloads an order of magnitude greater. That means it would be feasible to operate

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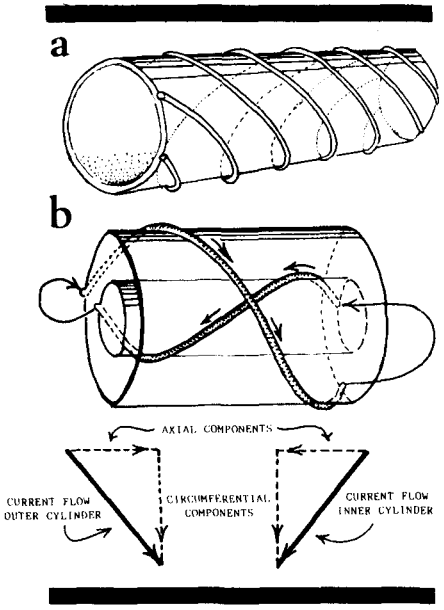

FIGURE 1. A Rotational to Linear Momentum Transformer Using A Homopolar Design. *(1) Sketch (a) shows a right handed helical winding with a significant pitch. We mount two such cylinders coaxially so that they are free to rotate independently. One has a right handed winding and the other a left handed winding as in (b). (The difference in cylinder size has been exaggerated.) Note the closed current path. The ends of the cylinders are connected through plasma "brushes."*
(2) The current in such helical coils has two components—circumferential and axial, with the ratio between the two a function of the coil pitch. The axial current components are opposed (see b) and cancel each other's magnetic fields. The circumferential components are in the same direction (see b) and reinforce each other's magnetic fields.
(3) Such a configuration can comprise one of many sections of a spaceport, admitting the lighter down the axis of the nested cylinders. The pitch of the windings varies with nominal vehicle velocity through the section—the higher the velocity, the steeper the pitch.
(4) During capture (deceleration), circumferential current is induced by the moving magnetic field of the lighter, but axial components are a byproduct of circumferential current and coil pitch. The lighter's field interacts with the axial current to generate torques which accelerate the two cylinders in opposite rotational directions. The energy liberated by the capture of a lighter is stored as rotational energy in the spaceport's coils.
(5) During ejection (acceleration), the coils are spinning with no current flow prior to the approach of a lighter down the tube. As the lighter arrives, its magnetic field is cut by the rotating coil windings to induce axial EMFs. The induced axial EMFs couple through the pitch of the coil to generate circumferential currents which act to accelerate the lighter. The rotational energy in the coils is converted to the linear motion of the lighter.

with larger lighters and lower arrival rates which allows us the economies that come with increased size such as relaxed mass constraints on the lighter's guidance and control system.

However, at this stage, it is premature to weigh the relative advantages of one design over another. What is important for us to notice is the principle common to all the schemes we have mentioned, whether they be elf-powered gnome-elevators, giant Moravec wheels, or orbiting spaceports. The common and essential principle is the energy exchange between falling and rising loads. The falling cage at the end of the spoke of Moravec's wheel provides the energy to lift the rising cage at the end of an opposing spoke. Similarly, the energy

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generated by the spaceport capture of an arriving lighter is exactly the energy needed to eject a returning lighter of equal mass.

You pay, of course, for your inefficiencies. In the case of the orbiting wheel there will be air resistance on the spokes as they stab into the atmosphere to touch the surface, etc. In the case of the spaceport there will be electromagnetic losses during the capture and ejection of the lighters, and the unrecoverable energy in the rocket exhaust gases required to put the lighters in a position to be captured. But the efficiencies of such linked systems are startlingly better than those of a rocketship which cycles none of its energy.

We may be further astounded to note that we do not necessarily have to pay for the payload we lift into space —*providing* we are bringing back to the Earth, in the context of our linked system, an equal amount of ballast. Indeed, if more mass is falling than is rising our space transportation system can cover its own inefficiencies. *And if the down traffic is great enough we will be generating surplus power!*

Space travel can be had for a negative energy cost. When we obtain a source of ballast out there, spaceflight is going to become cheap.

THE MOON

Strange how we see things. If the moon were a ball of frozen oxygen and oil we would have already created a roaring space industry powered by that largess—but because the moon looks like Nevada and feels like Nevada when we shift it through our fingers, we do not comprehend its potential. Oil when burned releases about 10 megajoules of energy for each kilogram of carbon dioxide formed. Nobody has yet noticed that raw lunar rock is an even better energy source than oil.

The energy potential between the moon's surface and the Earth's surface is 59 megajoules per kilogram of lunar material. That is 25,000 times the energy you get from a kilogram of water passing through the turbines of Hoover Dam. To make another comparison, our best rocket propellant, oxygen and hydrogen, delivers only 13.4 megajoules per kilogram of water created. Raw moon rock contains more than enough energy to break itself down into its constituent elements—when delivered to the Earth. The potential energy in moon rock is so concentrated that if we used it to supply 100 percent of the world's current power needs of about 3.5 trillion watts, it would take *40 billion years* to use it up. The sun won't last that long and the universe wasn't even here that long ago.

We don't propose dropping moon rock through turbines to meet the Earth's *surface* power needs. If nothing else, the Earth's atmosphere makes that impractical. But the resource is there and it *can* logically be used to power low Earth orbit space industry. It can make orbital transportation so cheap that space industrialization becomes commonplace.

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The moon can supply the ballast for our returning spacecraft.

There are various schemes for getting mass up off the moon into a position where we can "roll" it down to the Earth. Rocket power we can dismiss. Perhaps the best known method of cheaply lifting mass off the moon is the mass driver of G. K. O'Neill's group. In that scheme a conveyor belt of electromagnetically accelerated buckets dump their loads into space and return for more. A modification of this method is needed, however, when we try to import supplies.

Normally people think of landing on the moon as a vertical maneuver, but a horizontal approach, like an airplane, has distinct advantages. We can build a long "moonport," much the same as our spaceport, directly on the surface of the moon. An incoming ship, moving at the lunar circular velocity of 1680 m/sec, can be stopped by applying three gravities of deceleration along a 48 kilometer length of electromagnetic track. If the ship touches down at lunar escape velocity under the same conditions, we would need a track section twice as long.

As the ship approaches the surface, it is met by a light carrier riding magnetically over the track and equipped with superconducting coils. The carrier moves under the ship, captures it, and then applies the decelerating forces. The considerable power generated by this maneuver is fed into the lunar power grid. During take-off the track ceases to be a generator and acts like a linear synchronous motor, absorbing power.

Structurally the moonport is simpler than the spaceport. Being connected to the enormous mass of the moon, it can handle much heavier loads than can its more ethereal relative. The moonport is mainly limited by its electrical components. A one hundred ton spaceship, moving at lunar circular velocity and decelerating at three g's, is generating enough power to supply greater New York City.

We cannot ignore the moon. Resources and power are there at the headwaters of the mountains of space; the cities are down here at the river's mouth. To reap that wealth we must develop a technology which can extract the energy from a waterfall of lunar material.

INITIAL POWER FOR THE SPACEPORT

When the first orbiting spaceport is built, there will probably be no lunar base to provide a source of energy laden ballast. Even if lunar ballast were available, we would not choose to use it initially. The reason is simple.

To keep the capital investment down, we want a design that minimizes the amount of mass that has to be delivered by expensive rocket. The subsystem to receive lunar ballast and return the ballast carriers to high orbit represents mass that is not essential to the start up operation of the spaceport however much it contributes to the ultimate economy. These lunar mass

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receivers can be added later at much lower cost as we "bootstrap" to the final configuration.

Once our construction has reached the stage where the spaceport can capture and eject *one* lighter per orbit—a stage far below the capacity it needs for economic viability—we can begin to use the spaceport, instead of rocket shuttles, to supply the material that adds to its capacity. Specifically that means the spaceport can begin operation before almost any of its heavy power equipment has been installed.

How much mass do we invest in power plant to operate our minimal spaceport? And what kind of power will it be?

In last month's article we noted that 7.5 billion joules would be released by a 1000 kg lighter while it was being captured at half orbital velocity, and 15 billion joules would be required by an empty 500 kg lighter while it was being ejected to restore the spaceport's momentum balance. If we allow for a 90 percent conversion efficiency we must have 6.7 billion joules storage capacity to receive the energy from an incoming lighter and have in storage 16.7 billion joules when we want to accelerate the returning lighter.

Suppose we choose flywheels to hold our energy. Assuming a conservative flywheel rotational speed of 208 meters per second, we need 770 tons of flywheels for energy storage to operate one lighter. We also need an energy source to supply the difference between 16.7 and 6.7 billion joules. This translates to roughly a 1.85 megawatt capacity if we intend to handle one lighter per orbit. If we elect to use solar rather than nuclear power we need enough cells to generate 3.7 megawatts since the spaceport spends half its time in the shadow of the Earth. Thirty tons of solar cells at 8 tons per megawatt gives us our required capacity. Thus, for a total investment of 800 tons of power equipment to handle one lighter per orbit, we buy ourselves a payload delivery capability of 8 tons a day.

In one hundred days one lighter can bring up enough flywheels and solar cells so that the spaceport can begin to receive *two* lighters per orbit. With this doubling time it would take only a year and a half to build up to a capacity of fifty lighter captures per orbit, and three months later to 100 lighter captures per orbit. Since this is a geometric progression, we could reach an absurd capacity in very little more time. But long before we run into logistic problems, the clutter of solar cells begins to take its toll.

Solar energy crosses the Earth's orbit at a flux of 1340 watts/m^2, so that 3.7 megawatts corresponds to about 18,000 square meters of 15 percent efficient solar cells, or 75 modular panels 8 meters wide and 30 meters long. 7500 such modules, enough to power 100 lighter capture-ejections per orbit, could be attached along the side of the spaceport at intervals of 40 meters like the legs of a centipede. Since the separation between panels is five times the width of the panels, they

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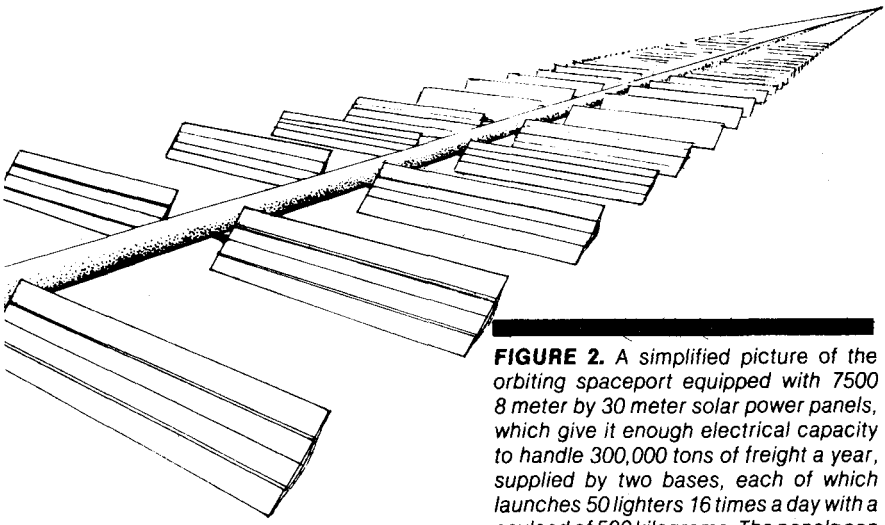

FIGURE 2. *A simplified picture of the orbiting spaceport equipped with 7500 8 meter by 30 meter solar power panels, which give it enough electrical capacity to handle 300,000 tons of freight a year, supplied by two bases, each of which launches 50 lighters 16 times a day with a payload of 500 kilograms. The panels can turn to face the sun. They are not operational at night for 45 minutes of each orbit.*

can rotate to face the sun without shading each other for most of half an orbit.

For greater capacities solar power starts to become impractical and we must look to alternate energy sources like the moon—but note that the spaceport already has a yearly capacity of 300,000 tons and that is well into the region of economic viability.

THE FIRST SPACEPORT

If we wish to begin building the spaceport within the next few decades its starting mass will be transported into orbit by some version of the Space Shuttle. The Space Shuttle itself has a payload of 21 tons for a due east launch. When the two solid rocket boosters are replaced by liquid propellant boosters we can expect a 50-ton payload. The Interim Heavy Lift Launch Vehicle (IHLLV) modification of the Space Shuttle would give us an 85-ton payload and the IHLLV modification with *four* liquid propellant boosters would give us a payload of 160 tons. All for roughly 20 million dollars a launch.

With only modified versions of the Space Shuttle we could expect to put a minimal 50,000-ton spaceport in orbit for a transportation cost of some seven billion dollars. That seems to be a large capital outlay until we see what it will do for us.

Assume that one ground base can launch a group of lighters spread over 200 km of the spaceport orbit. If they arrive at one-second intervals there will be about 4 km between lighters. That is 50 lighters per base per orbit for a yearly capacity of 150,000 tons to

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low orbit. With only two such ground bases supplying the spaceport we can build 30,000 megawatts worth of solar power stations per year. That power would replace 4 billion dollars *per year* of imported oil at $20 a barrel. The effect is cumulative. The second year we save 8 billion dollars, the third year we save 12 billion dollars.

Of course, one has to spend further money constructing the solar power stations, but money has to be spent *anyway* on power stations whether they be oil, coal, nuclear, or solar. The advantage of solar power stations is that you don't have to pay a billion dollars a year for black lung disease, you don't have to beat your brains out selling to Iran and Saudi Arabia and then flap around like fools trying to restabilize the governments your money has destabilized, and you don't have to finance Libyan terrorists, nor do you have any nuclear wastes to bury. The main side effect of an aggressive solar power satellite project is millions of good paying jobs for Americans.

As we have seen, at Space Shuttle delivery costs we must begin by assembling a minimum spaceport and from there use the spaceport to develop additional capacity. The initial structure will consist of three parallel "tubes"—a generator for receiving the loaded lighters at half orbital velocity situated in close proximity to an accelerator for returning the empty lighters at full orbital velocity, and a lightweight transport tube for delivering captured lighters to various points along the length of the spaceport and to the mouth of the return tube.

The generator and accelerator will lie side by side so that the power produced by an incoming vehicle does not have to be transported over long distances to get to the accelerator and the outgoing vehicles. The mass of the transport tube will be negligible since the power levels it handles are so small compared with the main tubes.

The first spaceport would be constructed in a 90-minute orbit whose point of northernmost transit passes over Kennedy Space Center. It would be desirable, of course, to assemble it in the equatorial orbit where it will eventually be used; however, Space Shuttle operations have been designed for Kennedy, and it is here assumed unlikely that we will undertake to build a new space center on the equator in the next few decades.

The ground bases which service and launch the small lighters can be built as floating platforms. They will have submerged flotation tanks and deep ballast for stability even in heavy seas. The first one will be set up in the Atlantic Ocean southeast of Cape Canaveral, where the southgoing leg of one spaceport orbit crosses the northgoing leg of the previous orbit. From that position you get two launch windows per day instead of just one. This base will be used to check out the spaceport while it is still in its construction orbit.

Once the spaceport has been debugged, it will be moved slowly to an

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equatorial orbit. The transfer might take as long as a year, using low thrust rockets distributed along the length of the spaceport. The base would be towed at sea and would continue to launch its lighters to supply reaction mass for the transfer rockets. Meanwhile the second base would be built at the equator. Once the spaceport reached equatorial orbit, operations would gradually be built up. Each base would now have 16 launch windows daily.

There would probably be some space manufacturing facilities included in the initial construction, and those would begin operating and returning some products. Most of the traffic, however, would be devoted to beefing up the spaceport's capacity. When the capacity was up to perhaps 100 thousand tons per year, construction would begin on three additional tubes. The first tube would be for boosting payloads to geosynchronous orbit and to lunar altitudes, the second for catching the returning high orbit lighters, and the third for transporting the high orbit lighters between the first and second tubes.

The high orbit lighters would begin to support the construction of solar power satellites and the initial lunar base. The power satellites would be brought on line as rapidly as possible to alleviate American dependence upon oil and nuclear fuels, while the lunar base would be a longer term project aimed at supplying "energy ballast" for the spaceport, liquid oxygen for rocket motors, and cheap raw materials for the mushrooming space industries.

MOON POWER

Imagine a time when a mass driver at a small lunar base is progressively stepping up the tonnage it is tossing into space. How can we extract power from this material? Recall that the potential energy difference between the moon's surface and the Earth's surface is 59 megajoules/kg.

The moon revolves around the Earth with a velocity of 1020 m/sec. If mass in the lunar orbit is slowed by 830 m/sec until it is moving at only 190 m/sec it will drop in toward the Earth, accelerating, until it touches the orbit of the spaceport with a velocity of 10,850 m/sec, overtaking the spaceport with a relative velocity of 3110 m/sec. If the spaceport is equipped to capture this mass, much as it captures a lighter from the Earth, two things will happen: the momentum exchange will propel the spaceport outward, and 4.8 megajoules of energy will become available for every kilogram of lunar mass.

Now we have an alternate way of balancing the momentum of our spaceport. The capture of an Earth lighter depresses the spaceport while the capture of a moon lighter raises the spaceport. Momentum balance is achieved when one kg of lunar mass is captured for every 0.8 kg of Earth mass that is picked up at half orbital velocity.

It is important to reiterate that a mass driver acting to capture mass is a

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generator of electricity. Thus if our spaceport is balancing its momentum by *capturing* both lunar and Earth mass it will be a power plant rather than a consumer of power. The spaceport can now increase its capacity to handle freight from the Earth *without further expansion of its solar power facilities.*

How much of the lunar energy are we using? One kg of captured lunar mass supplies 4.8 megajoules, 0.8 kg of captured Earth mass supplies 6 megajoules for a total of 10.8 megajoules per lunar kg. Used in this way 18 percent of the energy held by the lunar mass can be extracted and as such has about the energy density of stoichiometric oxygen/oil. (This energy represents one-fourth of that needed by the rockets to propel our sub-orbital Earth lighters.)

Can we do better than 18 percent? Yes. If we study the case where an empty lighter is launched to the spaceport to pick up raw material that has arrived from the moon—under the constraint of preserving the spaceport's momentum—we find that we can extract energy from the moon rock according to the formula

$$(r/r+1)\,(v-u)^2/2, \text{ in joules/kg,} \quad (1)$$

where r is the ratio of lighter mass to the moon mass it picks up, v = 10,850 m/sec, and u is the velocity of the lighter relative to the Earth at the time of contact with the spaceport.

Putting u as close to zero as possible increases the energy output. This represents the case when the spaceport is tuned to capture a lighter that has reached orbital altitude with no horizontal velocity. Henceforth assume u to be zero.

Our efficiency also increases when the ratio r is large but that is not as much help as it might seem. We are extracting energy from the moon rock most efficiently when we are bringing in none at all!

Let's take a more practical approach and balance the energy liberated at the spaceport with the energy expended to launch the lighters. We get, for the energy liberated,

$$f(r/r+1)v^2/2 - rx, \text{ in joules/kg,} \quad (2)$$

where r and v are as in (1), f is the efficiency with which our spaceport can extract electricity from kinetic motion (here assumed to be 0.9), and x is the energy per unit mass expended by the rocket motors to put the lighter in a position to be captured.

An elementary calculus maximum-minimum procedure shows that we can extract the most energy when

$$r = v\sqrt{f/2x} - 1. \quad (3)$$

All values are known except x.

To obtain x we make the following considerations. A standard rocket propellant, one part hydrogen to six parts oxygen, contains 13 megajoules/kg, and gives an exhaust velocity of c = 4400 m/sec in a reasonable engine. The mission velocity to reach 275 km with no horizontal velocity is about w = 3000 m/sec. Thus the lighter's mass ratio is

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$e^{w/c} = 2$, which means that $x = 13$ megajoules/kg since we are burning one kg of oxygen/hydrogen to place one kg of Earth mass at orbital altitude. Plugging this value into equation (3) gives $r = 1$.

Thus we obtain the most energy when an empty lighter rises to the spaceport and brings back its own mass in moon rock. Equation (2) shows that this procedure liberates a *surplus* of 13 megajoules for every kg of moon rock we import by rocket! That is like receiving two barrels of oil every time we burn one! Such "magic" is *not* perpetual motion, it is simply a way of tapping into the moon's potential energy.

The details of the packaging of the lunar material so that it can be captured, of the mother ships delivering the packages, and of the appropriate orbits are beyond the scope of this article. There *is* energy in moon rock and it can be utilized. There is so much energy that moon power alone could support a space transportation system vast enough to stagger a twentieth century mind.

THE IMPACT REACTION ENGINE

There is one problem still open. Our spaceport with its swarms of tiny lighters is great for delivering raw materials and small dense payloads to orbit, but it won't handle anything large and bulky. And it won't handle passengers. One solution to this problem is straightforward.

Our design was driven by the need to keep the initial spaceport mass as low as possible. After the spaceport begins operating, however, transportation will be cheap and mass won't be as important. We could then build a much larger spaceport that would accommodate large vehicles at low accelerations. This is an entirely reasonable approach, but it requires that we continue to rely on the Space Shuttle for passengers and large payloads longer than we would like.

An alternative and more interesting solution to the large payload problem involves what we call an impact reaction engine. Let us perform a thought experiment.

Suppose we have a stream of perfectly elastic balls moving with circular velocity c in orbit around the Earth. Suppose we place a massive ship in this stream with velocity u relative to the Earth. Further, suppose that this ship carries a perfectly elastic shield upon which the balls impact perpendicularly. The balls approach the shield with velocity $(c - u)$ and after impact bounce off the shield with reversed velocity, minus $(c - u)$. This bounce results in momentum changes and since rate of change of momentum is force we can calculate the force acting on our ship. The force in newtons is the mass in kg of the balls which bounce off the shield every second times $2(c - u)$ m/sec, and will accelerate the ship in the direction of the stream.

This is the principle of the impact reaction engine. The mass flow against the shield is analogous to the flow of propellant into a rocket

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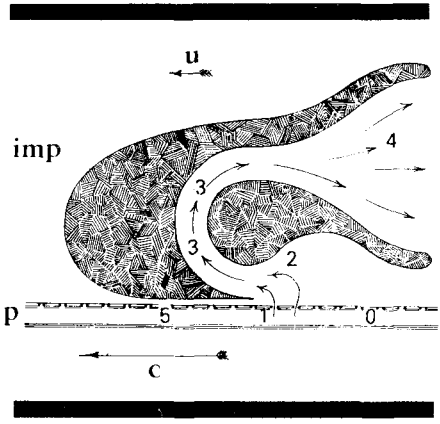

FIGURE 3. *In this schematic diagram of the impact reaction engine (imp), the ship approaches backwards, with velocity (u), the forward end of the orbiting pipeline and magnetic guide track (p) which overtakes it at circular velocity (c). Oxygen at (O) cannot escape because the valves are closed. Oxygen at (1), just prior to the ship's arrival, escapes through rapidly opened valves, where it is captured by the ship's scoops at (2) and swiveled through pipes (3) where it is ejected at (4). After the ship passes, the valves at (5) close. The impact reaction engine exerts a force equal to the mass flow through the engine times* twice *the difference between velocities c and u. Injected hydrogen, carried by the ship, can be used to cool the engine, simultaneously burning with the oxygen to increase the thrust. The oxygen is imported from the moon. The pipeline itself need not be very massive because the ship and pipeline do not exchange momentum while the ship is being accelerated.*

motor—with the exception that an impact reaction engine does not have to carry its propellant with it as does a rocketship. The velocity $2(c-u)$ is analogous to the rocket's exhaust velocity. The best rocket exhaust velocity we have today is the 4400 m/sec of the oxygen/hydrogen motor. If an impact engine, at rest relative to the Earth, entered a mass flow stream at an altitude of 275 km, its "exhaust velocity" would approach (depending upon the elasticity of the collision) 15,500 m/sec, 3.5 times as great as that from the Space Shuttle's motors! Of course, since $(c-u)$ tends to zero as the impact engine approaches circular velocity, the efficiency of this engine declines drastically at high speeds, a flaw which we shall see can be overcome by marrying the impact engine with the rocket motor.

The impact reaction engine makes an amusing thought experiment, but can it be built? There are no basic physical reasons why it cannot, and there are economic reasons indicating that it could wisely be utilized in passenger and heavy freight transport. Once a moon colony is viable it will be supplying mass to the spaceport both to generate electricity and to balance the spaceport's momentum. If we choose to import plentiful lunar oxygen for this purpose we can not only remove part of its potential energy in the form of electricity by capture, but can also extract a large portion of the remaining energy by disposing of the oxygen to power an impact system.

A basic scheme consists of an oxygen feed pipe and a magnetic suspension track laid parallel to the

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spaceport and perhaps far longer than 150 km. This need not be a massive structure since it would not have to take any great stresses. The accelerating impact ship exchanges momentum with the oxygen, *not* with the pipeline. Because of this fact, the impact ship, unlike our small lighters, can be quite massive. It can be as massive as a present day commercial jet aircraft like the Boeing 727.

The oxygen intake of the ship rides along the suspension track only centimeters from the oxygen supply jets on the pipeline, which are pulsed for a few milliseconds prior to the passage of the ship. The track and pipe must be extremely straight because, at the speed of the ship, there is no possibility for it to follow bumps and irregularities. But that is why laser beams and active control systems were invented.

As the oxygen is scooped into the vehicle it is guided through tubes in such a way that its direction of flow is reversed through 180 degrees. As we have seen, the force applied by this impact is the product of the mass flow times *twice* the relative velocity between ship and pipeline. At any relative velocity above 2200 m/sec oxygen alone in such a reaction engine will do better than an oxygen/hydrogen rocket —and not be required to carry its own reaction mass.

Some heating through compression and turbulence will occur and there will be boundary layer friction. But the object of the game is to keep as much of the oxygen's energy as possible in kinetic form. That requires that its *speed be maintained* while its *direction is changing*. We can get a worst case estimate of the heating problem by assuming that the oxygen is completely stopped by the impact and then expanded through a rocket nozzle.

Cold oxygen impacting at half circular velocity and brought to a dead stop will only rise in temperature to 4500°K, about five or six hundred degrees hotter than the normal operating range of an oxygen/hydrogen rocket chamber. At these temperatures the dissociation of oxygen into monatomic oxygen is soaking up a great deal of energy. Since we will not be stopping the oxygen, we will not have to deal with such extremes except at very local boundary regions where we can use dynamic insulation with hydrogen to keep the flow surfaces cool.

As the relative speed of ship and pipeline falls, so does the performance of the impact engine. The declining thrust can be compensated by adding ship supplied hydrogen to the reaction, the hydrogen doing double duty as a coolant. By the time the ship has stopped we will be using the standard 6 to 1 oxygen/hydrogen mix ratio and will have dropped down to an exhaust velocity of 4400 m/sec.

The performance of such a ship makes it worth investigating seriously. If we could build a hybrid rocket-impact vehicle that reaches orbital altitude and half circular velocity by means of oxygen/hydrogen rockets, and then achieves the second half of its

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velocity through impact acceleration, it will go into orbit starting with a gross-lift-off-mass only 3.5 times its final mass—an easy design criterion for an oxygen/hydrogen vehicle to meet.

For those who want to do some quick back-of-the-envelope calculations themselves, the formula to compute the mass m needed to change the velocity of a ship of mass M from u_o to u_f is:

$$m = (1/2)M[\ln(c - u_o) - \ln(c - u_f)] \quad (4)$$

where c is the velocity of the oxygen supply pipeline and ln is the natural logarithm. If we carry hydrogen and burn it with the impacting oxygen, the equation is slightly more complicated and does *not* give an infinite m when $u_f = c$!

THE OPEN END

At about the time the construction begins on the three tubes to launch and receive high orbit lighters, the gas supply pipe and track for the large impact vehicles can be installed. The advanced versions of the current Space Shuttle should be ready for commercial retirement at this point and it is not necessary to wait until lunar oxygen is available to phase in the impact powered ships. They can be operated with oxygen imported from Earth by the lighters. This is not as economical a procedure as using lunar oxygen, but quite a feasible interim approach. The impact ships will deliver cargo not easily packaged in the half-ton size and will transport people.

As the lunar mining operations get started, the arresting tube for the in-

FIGURE 4. *An empty lighter which meets the spaceport at the given velocity (x-axis) can return with a ballast of lunar rock and show a net energy profit (y-axis) without changing the spaceport's momentum. The curves are for lighters powered by oxygen/hydrogen and oxygen/kerosene. The numbers along the curves indicate the optimal mass of lighter needed to bring in a unit mass of lunar ballast. The curves terminate where momentum considerations no longer allow the return of the lighters.*
Slightly different assumptions were made in the body of the article for the sake of round numbers. The above curves were based on the assumptions:
(1) The mission velocity needed to attain capture velocity 7740k m/sec is $u = \sqrt{5.17 + 59.9k^2}\,10^3 + 500$ *m/sec.*
(2) A kilogram of rocket propellant contains E joules, where $E = 13x10^6$ *joules for oxygen/hydrogen and* $E = 10^7$ *joules for oxygen/kerosene.*
(3) The effective exhaust velocity is c, where c = 4400 m/sec for oxygen/hydrogen and c = 3000 m/sec for oxygen/kerosene.
(4) The energy cost to put a unit mass of lighter in a position to be captured by the spaceport is $X = E(e^{u/c} - 1)$.
(5) The spaceport is 90% efficient at converting between kinetic energy and electrical energy.
(6) The energy released is determined by formula 1 from the body of the article.
(7) The transactions are constrained to leave the momentum of the spaceport unaltered, thus the lighter plus ballast are returned to the Earth at velocity (10,850 + 7740kr) / (r + 1) m/sec, where r is the ratio of lighter mass to lunar ballast.

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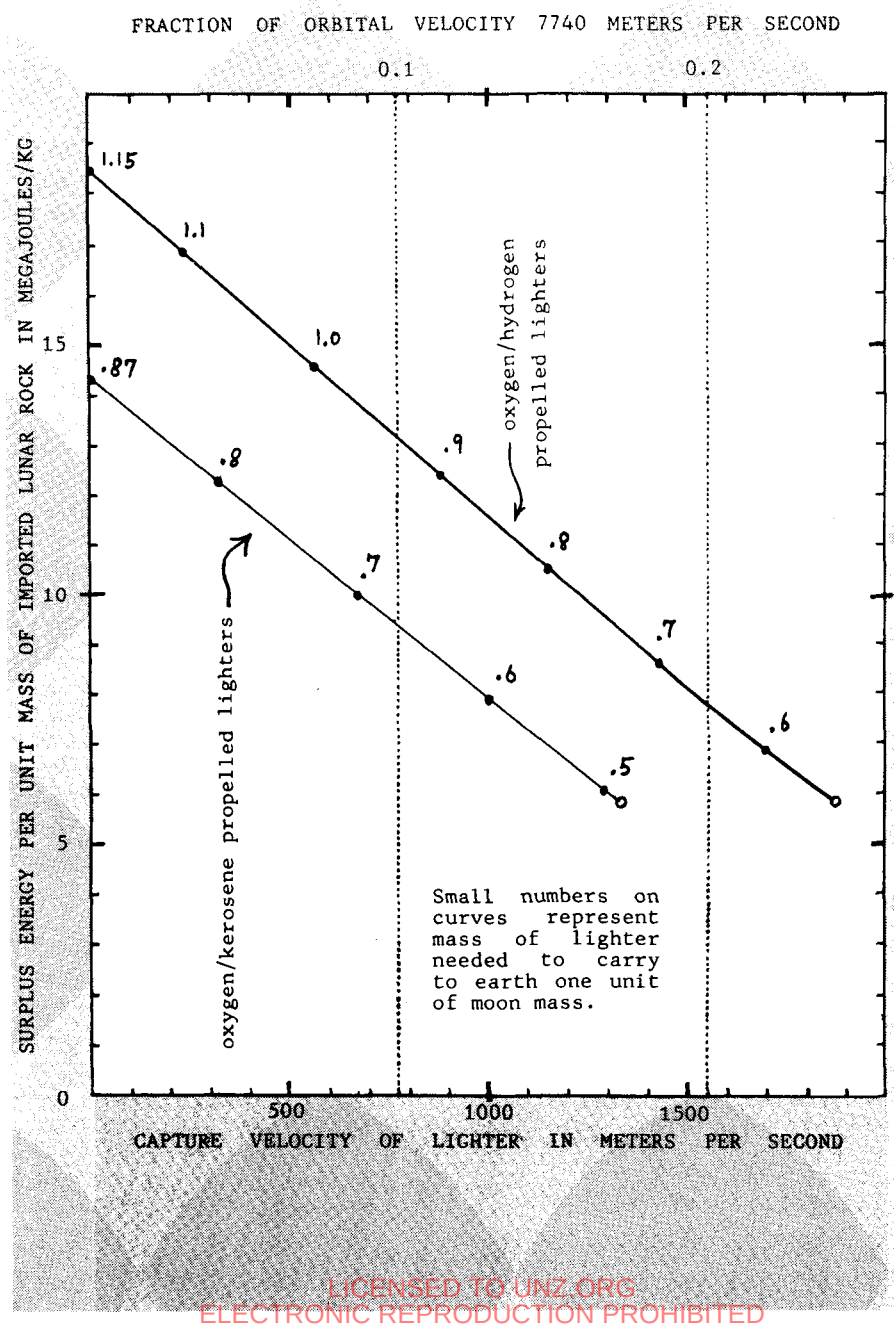

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coming high orbit lighters will be beefed up to handle loaded rather than empty vehicles. With more mass coming down to balance mass going up, engineers can tune the Earthside receiver to handle arrival velocities closer to full orbital, giving better launch economies.

We have reached a take-off point.

In "Space For Industry," one of John W. Campbell's more famous editorials written at the beginning of the space age when rockets were just becoming popular, he said, "We're never going to get any engineering use of space until we get something enormously better than rockets...something that can lift and haul tons with the practical economic efficiency of a heavy truck." He made the obvious point, "Heavy industry has always developed where three things were available; cheap raw materials, easy access to markets, and cheap energy supplies." The spaceport is something enormously better than rocket transport. It has nearby lunar raw materials which can be shoved downhill and tapped for energy, and it has available solar power satellites and large, light mirrors to concentrate solar energy. Even the metals and water and carbons of the asteroid belt are not that far away, all downhill to the markets. The markets? The spaceport sits within a 90 minute glide of any point on Earth.

More and more manufacturing facilities will inevitably mushroom along the spaceport as material and power become cheaper. Freight capacity will soar. The spaceport itself will be generating thousands of megawatts and asking for customers.

At the beginning of the next century we may begin to see heavy industries like steelmaking moving into space with the energy and ore. Steel will begin to face heavy competition from lunar aluminum and titanium as well as exotic alloys. Today the saying is: "If it can be done on Earth, it will be done on Earth." Tomorrow the saying will be, "If we can do it in space, let's do it there." Try to find land these days to build a new steel mill or a new power plant or a new telescope. Try to buy into somebody else's water, or take over somebody else's recreation area. It is going to get worse. In the future, space may be *the* place to get things done. Why not? The resources are there and the energy is there, and with space comes access to all markets. As a bonus, politicians like Proxmire loath it.

The single most important concept we need to make real in our minds is that spaceflight is not going to remain expensive off into some vague indefinite future. Today's technology applied on the proper scale is good enough to make it cheaper than jet flight. All we need is to take that intangible decision to use what we already know.

Let the Earth be healed. We can plant trees again, and stock the rivers for fishing while the chemical plants brew in space and the forges of the smelters consume the solar heat they lust after, closed away in their self

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contained environments that do not touch what they were not meant to touch. Let the Earth heal while we mine the moon and build the catapults that will fling us beyond Mars.

CONCLUSION

Of course, it doesn't look easy now. We are city dandies and space is a fierce steep river that winds up through the tallest mountain range that mankind has ever faced. It is a bootstrap operation. We need that energy glutton, the Rockwell Space Shuttle, and we need far more of them than we have scheduled for production. We need more rockets and bigger ones just till we get a foothold, till we can get the flow started from moon to Earth.

Then we can be a rich commercial nation again, with full employment, doing what we love to do, those conjuring tricks that no one else seems fast enough to keep up with, while we sell to the rest of the world the high technology that will make them prosperous, too, and save them from the kind of primitive industrial machine that has half-killed *us*.

Why turn back to smoggy coal? Why complain when others make shoes and television sets better than we do? We have already passed through that phase and are ready for the next adventure. We are uniquely capable of creating the kinds of jobs that no one else can create. We can make space travel cheap just like we made ground transportation cheap, just like we made air travel cheap. We can be the generation that makes America great again. Remember the American Way?

All it takes is looking at a problem as if it has never been looked at before. ■

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Part III

Clifford D. Simak

the visitors

There's a saying about "killing with kindness." But it can be hard to know exactly what that means—while it's happening.

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To be published in 1980 by DEL REY Books.

Vincent DiFate

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SYNOPSIS

An alien, in the form of a black box the size of a large building, lands at the small town of Lone Pine, Minn. In landing, it crushes a car owned by Jerry Conklin, who has parked it at the end of a bridge while he fishes the pool below the bridge. A resident of Lone Pine fires a rifle at the black box, which returns the fire, killing him. Conklin is seized by a tentacle extruded by the alien and jerked inside it. Realizing it may be an alien, he tries unsuccessfully to talk with it. He is a graduate forestry student at the University of Minnesota and gains the impression that the alien is somehow like a tree; also he gets a strong impression of home and wonders if the alien is trying to communicate with him. When the visitor finally throws him out it has crossed the river into a heavy forest and night has fallen. Unable to find his way out, Conklin spends the night in the forest.

Alerted by Frank Norton, owner and editor of the Lone Pine weekly newspaper, Johnny Garrison, city editor of the Minneapolis Tribune, *sends Kathy Foster, a reporter, and Chet White, a photographer, to Lone Pine to cover the story. Norton and Garrison are long-time friends; Kathy and Conklin are romantically attached.*

In Washington, D.C., President Herbert Taine is informed by Gen. Henry Whiteside, Army Chief of Staff, that tracking stations have discovered a new satellite, too massive to have been launched from Earth. At about the same time the President is told about the Lone Pine landing by David Porter, his press secretary. In the hours that follow the President's cabinet and advisors attempt to formulate a policy to handle the situation, but are unable to; this is a situation without precedent and there are no guidelines. Porter talks with Alice Davenport, his girl friend, and her father, a senator who is not friendly to the administration. The senator urges that the United States learn all it can from the visitor and use what it learns to national advantage.

In Lone Pine, the visitor begins eating trees, ingesting them and extracting the cellulose, which it ejects in bales. Conklin finds Kathy and tells her what has happened, but says he does not want it known that he was "taken up" by the visitor; he does not want to become regarded as another flying saucer kook. With his crushed car hauled away by federal authorities, Kathy arranges for him to get back to Minneapolis.

A shuttle sent out from a space station learns that the new-found satellite is a cluster of other visitors, apparently waiting word from the Lone Pine visitor before coming down to Earth. The country so far has remained relatively calm, but this development results in near-panic in the White House.

At Lone Pine, the visitor begins budding tiny replicas of itself that immediately begin eating the bales of cellulose. When one of the baby visitors tips over and can't right itself,

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Kathy helps it. She puts her hand against the adult visitor's side and says, "Mother, I helped your baby." The hide of the visitor folds over her hand, gently enclosing it, as if in a handshake. Kathy is shaken and enthralled. A short time later the adult visitor takes off and flies away. Before it leaves, one of the federal investigators has painted the number 101 on it in green paint.

The cluster of visitors in space now begins to break up and the visitors start coming to Earth, most of them landing in the United States, a few in Canada. They cause much furor, but little damage. A few lumberyards are gobbled up for the cellulose they contain, a few houses also are ingested but this soon stops when the visitors apparently realize it is something they should not do. A few cars are snatched up from a used-car lot. By and large, however, the visitors seem to be refraining from causing trouble, but they are nuisances—they fly alongside planes, patrol roads, look over cities and industrial plants, land on airstrips at airports. A fair-sized group of them land at Lone Pine and begin eating trees; in many other places they also eat trees and spew out bales of cellulose. The public reacts fairly well. There are a few riots and some disturbances. Suddenly godstricken people flock to church; evangelists and cult leaders have a field day.

Shaken by the budding of baby visitors, the White House faces chaos with the arrival of thousands of visitors. Whiteside insists that tests be made of the visitors' defense ability; he proposes firing a .30 caliber bullet at the visitor from a rifle similar to the one used by the Lone Pine resident, observing by high-speed cameras and other instruments what happens. Whiteside insists this is necessary in order that a defense against the visitors can be planned. There is argument over whether other nations should be invited to participate in the study of the visitors, whether the results of such a study should be shared with the world.

When Whiteside carries out the test, it is found that the visitor is able to convert the kinetic energy of the bullet into potential energy and throw it back to its origin. The consensus is that the visitors can do this with any weapon short of a nuclear missile. It is apparently, a purely defensive device.

At Lone Pine one of the visitors is found dead and a task force of investigators is sent there, the national guard sealing off the area while the visitor is dissected in an attempt to learn its physical characteristics. Kathy, covering the story, is unable to learn anything. Neither is the Washington press corps. Security is tight.

Norton, talking with Kathy at Lone Pine, invites her and Conklin to accompany him on an annual autumn trip he makes into the wilderness. He is going in a short time, he says. Kathy declines; she has used all her vacation time and Conklin is hard at work on his dissertation.

The first visitor to land, the one on which the number 101 has been

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painted, turns up on an Iowa farm. Conklin, haunted by the experience of being "taken up" by the visitor, determines to see the visitor again in hope that it may give him an answer. He borrows a car and goes to Iowa. The visitor at first pays no attention to him and he leaves. Halfway home, he turns the car around and goes back. This time the visitor takes him up and communicates with him.

37. WASHINGTON, D.C.

"Daddy," said Alice, "I don't like some of the things that I have been hearing."

Senator Davenport, slouched in his chair, looked at her over the rim of his glass of Scotch.

"And what might you have been hearing, my dear?" he rumbled.

"All this talk up on the Hill—not out-loud talk, just cloakroom talk—about developing some sneaky way to get rid of the visitors. Like spraying psychedelic drugs on the trees that they are eating, like spending billions to develop a bacterium or a fungus that might be fatal to them. Saying it is better to spend a few million to get rid of them and let things get back to normal than to spend the same few million to find out about them."

"I do believe," said the senator, in an unusually mellow mood, "that I have heard snitches of such talk. Pest control, it's called. Not waging war against them—just pest control."

The senator shifted in his chair to look at Porter.

"Maybe our White House friend might have some comment on this."

"I would think," said Porter, "this is one I had better stand aside on."

"Some of the boys, you know," said the senator, "seem to be getting a bit wrought up about the situation. They're just talking among themselves so far, but, before too long, they may go beyond that."

"To even think, this early, about wiping out the visitors," said Porter, "seems somewhat premature. I've heard some loose talk about developing a selective disease that would zero in on them. To my mind, it's only talk. No one has the least idea of how to go about it. First, you'd have to know what the visitors are and how their life system functions. Only until you knew that would you have any clue as to how they might react to various agents. There's a trap in the matter of selectiveness as well. How can we be sure that what would be developed would be selective? We might wind up with something that would wipe out not only the visitors, but the human race as well."

"It's a monstrous idea in any case," said Alice. "We have no real grievance against the visitors."

"Oh, I don't know about that," said the senator. "Talk to a true blue environmentalist who has persuaded himself that unless some action is taken, these things will destroy the last remaining wildernesses and you might detect a grievance. Or the president of a lumber company who has just had a couple of lumberyards consumed as a

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quick lunch by one of our big, black friends. Or an airline official who is turning grey over the possibility that one of his jets will collide with a friendly visitor-escort. Or a man in an airport control tower who has one less strip on which to bring down planes."

"It's a matter of minority interests again," said Alice. "Small cliques trying to push around the rest of us."

"I'm surprised to hear you say that, daughter," said the senator. "It has seemed to me that you have always been fairly well minority-oriented. The poor downtrodden blacks, the poor downtrodden Indians..."

"But this is different," said Alice. "My minorities are cultural minorities; yours are economic—poor downtrodden businessmen who suddenly feel a pinch."

"The environmentalists," said the senator, "aren't economic. They're emotion-oriented troublemakers."

"I'm beginning to have a feeling," said Porter, "that the public attitude toward the visitors may be in the process of change. At first, they were novelties and an occasion for a great excitement. Now they seem to be becoming irritants. They now are just black lumps, perched around the landscape, or flying over it, and in a number of rather minor ways, they are interfering with the daily lives of some people. Given a few months, probably only a few weeks, the minor irritations may grow into dislikes, maybe even hatreds—not originating in the special interests that are most affected, but in that phenomenal area we call public opinion. It would be a pity if this should happen, for we simply have to have the kind of patience that will give us an opportunity to find out what they are and how we can get along with them."

"Allen is working on that one out in Minnesota," said the senator. "Is he finding anything at all?"

"Nothing that I know of, Senator. Nothing definite. He's not made even a preliminary report, if that is what you mean. But there is some scuttlebutt floating about that they are plants—at least, that they belong to the plant kingdom."

"Plants? Christ, that doesn't make any sort of sense."

"No, of course, it doesn't. I've been trying to track down where the rumor came from, but have had no success."

"There's this business, too," said the senator, "that the visitors may know how to control gravity. That's the one I'm interested in. That's something we could put to use."

"Mostly it comes from the fact that they float a few inches above the ground and that when they move, they don't seem to make use of propulsive units," said Porter. "Or at least propulsive units as we think of them. No one really knows, of course. The idea is no more than someone grabbing for an explanation—any kind of explanation for a mode of operation that defies all the physical laws we know."

"You two talk only about what we can gain from the visitors," said Alice. "Doesn't it enter your thinking

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that they may be thinking along the same lines—what they can get from us?"

"Well, sure," her father said. "They are getting cellulose. And cellulose is cheap enough if we can get gravity control from them."

"They also got a few cars."

"Well, yes, a few of them. Just that one time. Not any more. They're not taking cars any more."

"I've wondered," said Alice, "what they wanted the cars for. And I can't understand you, Daddy. To start with, you were up in arms about them—destroying trees and lumberyards, upsetting the country's business."

"I rethought my position," said the senator. "I began to see some rather attractive possibilities, if we can play our cards right." He said to Porter, "I keep hearing about a weapons test conducted against the visitors. It's a story that keeps floating around, but I can't get a handle on it. What do you know about it?"

"The same as you," said Porter. "I keep hearing the story."

"Nothing positive? No details?"

"None at all," said Porter.

"These things must have some sort of defense worked out," said the senator. "Out in space, they must have been open to some sort of attacks, although I can't imagine what kind of attacks. It would be nice if we could find what they have."

38. MINNEAPOLIS

The editors sat at the news huddle in the conference room. The sound of clacking typewriters and the hum of conversation came through the halfway open door.

"We have the Black Hills-Indian story that Jones wrote," said Garrison. "We should be getting that in the paper soon."

"I thought you were saving that for the Sunday edition," said Lathrop, with raised eyebrows.

"So I was, but it kept getting crowded out. Keep it too long and it could get dated. There is, as well, a piece that Jamison has been working on for weeks, an analysis of what a real energy crunch could do to this area. It's a good job. He talked with a lot of people. He really dug into it. It's long, but it looks as if we have the space today. There isn't much other news. I'd say we could strip it across the top of the front page."

"Haven't we a good story on the visitors?"

Garrison looked at Gold. The assistant city editor shrugged. "Nothing to get excited about. It's beginning to level off."

"As a matter of fact," said Garrison, "I'm beginning to have the feeling that the visitors haven't as much impact as they had a week ago. The edge is beginning to wear off the story. The readers may be getting a little weary of it. We've played the story hard. That was fine so long as the readers were avid for it. But if we keep on cramming it down their throats..."

"How about Kathy? She's still up

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at Lone Pine, isn't she?"

"She is," said Gold, "for all the good it does. There's nothing coming out of there. No one's getting anything, either from there or Washington. I've never seen the lid clamped down so hard."

"It sounds," said Garrison, "as if something fairly big is going on. Otherwise, why all the secrecy? But, apparently, we aren't going to get anything until someone is willing to talk."

"What about the Washington bureau?"

Hal Russell, the wire editor, said, "They're not getting anything, either. I talked with Matthews just a couple of hours ago. Nothing, he said. Absolutely nothing. Either no one knows anything or they are clamming up. Some rumors, but nothing that can be pinned down. Chances are, if anyone knows anything, it's only a few. In Washington, if more than a dozen people know something, one of them is sure to be talking about it. The news leaks out."

"So why are we keeping Kathy up at Lone Pine?" asked Lathrop. "If Washington is tight-lipped, what chance does she have?"

"Kathy is one damn fine reporter," said Garrison. "She has as much chance to dig out something as the Washington bureau."

"I think we ought to get her back here," said Lathrop. "With vacations and one thing and another, we are running shorthanded. We could use her here."

"If you wish," said Garrison, grim with a sudden anger.

"If you're still looking for a backgrounder on the visitors," said Gold, "Jay has an idea. He was talking the other day with someone at the university, a man in the Native American affairs department. This man was drawing a parallel between us and the visitors and the Indians and the white men when the whites first showed up in America. He said the reason the Indians finally lost out was that their technology was upset by the white man and that, as a result of this, they lost their culture. Their defeat dated from the day when an Indian wanted an iron hatchet, to replace his stone tomahawk, so badly that he was willing to sell his natural resources, to enter into trade arrangements that were unfair to him, to get it."

"A story like that would be oblique propaganda," said Lathrop, "and both Jay and you should know it."

"Jay wasn't about to write it from the Indian view alone," said Gold. "He was going to talk to economists and historians and a lot of other people..."

Lathrop shook his head. "With the Black Hills-Indian situation, I think we should keep away from it. No matter how well the story was written, no matter how objectively, we would be accused of bias."

"Oh, well," said Gold, "it was only an idea."

39. IOWA

The river gurgled and lapped

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against the shore. Dick's Landing, located on a shelf several feet above the river, was made up of several dilapidated buildings. Above the buildings reared the steep heights of the Iowa bluffs. Beyond the river's edge was an island that hemmed in the channel or, rather, one of many channels, for here the Mississippi, spreading out on a wide flood-plain, became a watery jungle. To the east loomed the blueness of the distant bluffs on the Wisconsin side.

Jerry stood still on the riverbank, watching the progress of the small rowboat powered by a small and sputtering motor. The boat made its doubtful, hesitating way up the channel, bouncing in the roughness of the current. In the back of it crouched a hunched-over man, nursing the balky motor.

Opposite the landing, the man angled the boat in toward shore, finally bringing it in against the shaky dock. When he clambered from the boat and tied it, Jerry saw that he was older than he first had thought. His hair was an unruly iron-grey and his shoulders slightly stooped, but when he moved it was with the sprightly spring of a man much younger.

He came along the walkway of the dock and up the bank. When he came close, Jerry asked, "Are you Jimmy Quinn?"

The man halted in his tracks and looked at him with clear blue eyes, the skin at the corners of them wrinkled and squeezed into intricate crows-feet.

"That I am," he said. "Who's doing the asking?"

"The name is Jerry Conklin. I was told you'd be coming in soon. I understand you know these bottoms."

"Man and boy I've known the Winnishiek," said Quinn. "A river rat I'm called and I guess that's what I am. These bottoms I have known since the day that I could toddle and a tangled mess they are. Islands and sloughs and lakes and channels, and I know them all for miles up and down the river. I've hunted them and fished and trapped them and I've poked into every corner of them. And what can I do for you?"

"I understand that some of the visitors have landed somewhere in the area, somewhere in the river bottoms."

"Visitors? Visitors? Oh, yes, now I know. I've heard the name. You mean those big black boxes folks say came out of the sky."

"That's what I mean," said Jerry. "You sound as if you saw one."

"Over on Goose Island," said Quinn. "That's the big island, plumb in the center of the river valley, four or five miles downstream from here. Near as I could make out, there are three of them. I don't know if they are still there. Just saw the tops of them, sticking out above the trees. It was getting on toward evening and I didn't linger none. Maybe I wouldn't have even if it hadn't been getting on toward evening. Spooky things they were. Nothing that belonged there. Gives a man shivers up his spine. Didn't rightly know what they were

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first off. Figured it out later on that they must be these visitors. How come you know? I never told no one. People would have laughed at me. They think I'm crazy anyhow. To tell the truth, perhaps I am. I've been too long on the river."

"Would you be willing to take me to them?"

"Not now," said Quinn. "Not today. It's getting on close to night. This river's not a place to be at night. With the kind of motor that I have, it's a long way down to Goose. Dark would catch us on the way."

"Tomorrow, then. Or the day after tomorrow, more than likely. There is someone else who will want to go along. It may take me a while to locate this other person and she'll have to drive down from Minneapolis."

"A woman?"

"Yes, a woman."

"What would a woman want with them visitors?"

"She just possibly may know more about them than anyone in the world today."

"I be damned," said Quinn. "These days you never know what to expect of a woman. Should I take you down there, would there be something in it for me?"

"We'd pay you."

"Cash money?"

"Cash money," Jerry told him.

"You expect to get up close to these things? If they still are there. They might have left, you know."

"We would want to get close to them," said Jerry.

"I tell you, mister, I'm not getting up close to them. I'll take you there and I'll wait to take you back. But I'm not getting close to them."

"You won't have to come along with us. You just point them out. That's all you'll have to do. And wait to take us back."

"You let me know when you need me. Generally, I'm on the river the most of the day. Come in along toward evening."

"I'll let you know," said Jerry.

40. WASHINGTON, D.C.

Allen, the presidential science advisor, said, "This is only a preliminary report. Later on, there'll be more."

"You've found something, then," said the President.

"Something," said Allen. "Yes, something. It's hard to believe. I have a hard time making myself believe it. But the analysis is there. The facts are undeniable. There is no ground to quarrel with them."

"Doctor," said Whiteside, "you look a little pale around the gills."

"I suspect I do," admitted Allen. "This goes against the grain, against all the knowledge that we have. Those damn things are made up of cellulose."

"Cellulose?" asked the President. "That white, fluffy stuff?"

"When the visitors get through with it, it's no longer white or fluffy." Allen looked around the room. "There are only four of us. Will there be others arriving?"

"Not this time," said the President.

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"Later on, when we know more, there may be another briefing with other personnel. This time around, just the four of us. General Whiteside has a special interest and should know what you've found. Dave is here because, by and large, he knows everything I know. At the moment, everything you say here is confidential. I assume your staff is not doing any talking."

Allen stiffened. "Only four men are involved," he said. "They understand the need of confidentiality."

"But there are a lot more involved than four," said Whiteside.

"The others are field workers," said Allen. "Collecting samples and doing other basic work on the Minnesota visitor. Only four are involved in the lab work. They are the only ones who know what I'm about to tell you."

"O.K., Doctor," said the President. "So go ahead and tell us."

"The creature basically is made up of cellulose," said Allen. "But not cellulose in the form that we know it. To precisely describe the situation, we have had to make use of highly technical terminology."

"Which we wouldn't understand," said the President. "You'll have to simplify it for us, Doctor."

"I'll do what I can. What I tell you will have to be oversimplified. And because of the oversimplification, perhaps a little short of the exact truth, but it will give you an idea of what we have come up with.

"The inner part of the creature is closely-packed cellulose, compressed to an unbelievable extent. So closely packed that it can withstand structural stresses of several tons per square inch. Ordinarily this would seem impossible, but the figures are there. How it can be managed we have no idea, no inkling as to the process involved."

"You talk about the inner part of the creature," said Whiteside. "Does that mean the outer part is different?"

Allen shuddered. "Yes, General, it is different. An entirely different story. It is what you might call a cellulose-silicon polymer involving in some manner that we're not sure we understand the use of silicon-oxide bonds and hydroxyl bonds—that is, hydrogen-oxide bonds. There is a lot of oxygen in cellulose. In the silicon-oxygen bonding, there are a couple of different forms and, to make matters even more complicated, a mix of the two forms are employed. In some cases, it amounts to a tetrahedral structure, a silicate akin to rock—a structure similar to feldspar and quartz. It's hard to say exactly what we have. There are a number of various linkages to make up what we tentatively describe as a polymer."

"It seems to me you are talking about the thing having a rocklike skin," said Porter.

"In layman language, that is what I am talking about," said Allen. "Hard as rock, probably much harder, and yet the silicon provides it with some elasticity, some give. Rocks can't normally be dented. This stuff can. It can be dented and then bounces back. It has at once hardness and ductility and

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an incredible thermal stability.

"We have theorized the use to which these capabilities can be put. It is only a theory, of course, but it does make sense. If these things operate across vast extents of interstellar space, they would have to get energy from somewhere. Their high thermal stability means they could soak up all sorts of energy, a lot of it, perhaps, from the impact of interstellar dust. The dust particles, no matter how small, would carry some energy. But in the form of kinetic energy. We think the skins of these things can convert the kinetic energy to potential energy, possibly can change that energy to whatever form it needs. Occasionally, they might collide with larger pieces of matter. Such a strike would indent the skin, with the skin picking up as much energy as it could handle, deflecting what it can't use when the indentation in the skin bounces back, in effect rejecting that part of the energy it can't handle. The dent in the skin would produce a reflected wave of energy, getting rid of it as the surface of a mirror would reflect sunlight."

Porter sneaked a quick look at Whiteside, who had stiffened in his chair and now wore a slightly slack-jawed appearance.

Allen sighed. "We also have some reason to believe," he said, "and I can't go into this as closely as I would like, for it can't be explained in layman terms—but we have reason to believe that the skin's composition is such that it can change gravitational flux and thus points to the possibility that the creatures can manipulate gravitational forces, that they can either be attracted or repulsed by gravitation. Which would explain, if true, how they are able to float an inch or two off the ground. It might also mean that gravitational control may be, at least partially, an explanation of how they travel through space. Locked in on a gravitational source in the direction in which they want to travel, they would move toward the source. Locked into another behind them, they could utilize it as a repulsor to push them away from that source."

Allen ceased talking and looked at each of the three in turn.

"Well, that's it," he said. "It sounds insane and I keep telling myself it has to be insane. Aliens, we said. And these things are alien. What bothers me, what keeps me awake at night is this—if they are so alien in the physical sense, how alien are they mentally? What chance will we ever have of understanding them, what hope they will ever be able to understand us?"

"Perhaps the intellectual span is not as great as the physical span," said Porter. "They seem to have done a fairly good job so far in understanding us. Somehow they seem to have sensed a lot of things they should not do. They have fairly well kept within the basic rules of human conduct."

"I hope you're right," said Allen. "I sincerely hope you are."

He spoke to the President, "In a couple of weeks, we may know more.

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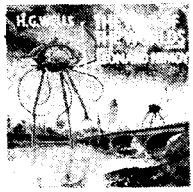

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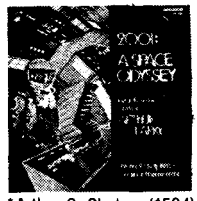

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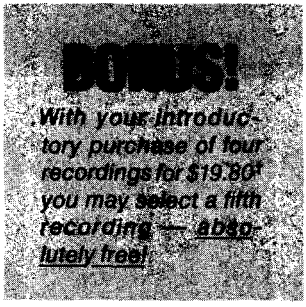

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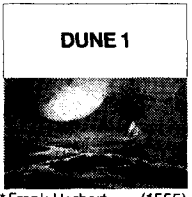

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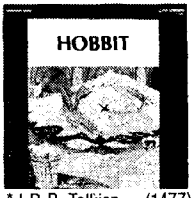

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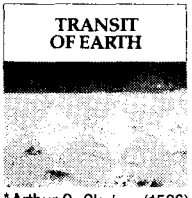

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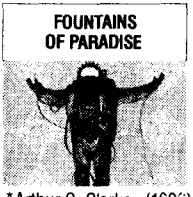

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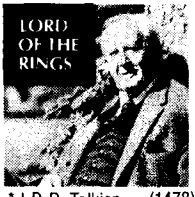

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We may find that some of our present thinking is wrong. We may have to modify our theories. Or we may come across some new and significant data. For the present, I have told you basically all I know. Of course, it could be elaborated upon endlessly, but there's no point in doing that now."

He rose from his chair, hesitated for a moment.

"There is one other thing," he said. "Interesting, but probably not too significant. But it does throw some further light on the visitors. You have heard of 101, of course."

The President nodded. "The first of the visitors to land at Lone Pine. I understand it's down in Iowa now."

"That is right," said Allen. "It is guarding a field the farmer had just finished plowing. The farmer claims that it passed back and forth over the field as if it were planting something. When anyone approaches, it drives them off. One of our observers, however, managed to sneak up to the edge of the field without being driven off. He found that the visitor had planted pine seeds. Earlier we had been somewhat puzzled by the fact that the debris which was rejected by the visitors after they cut the trees contained virtually no pine seeds. Now we know why. The visitors winnow out the seeds and intend to plant them."

"It will take a long time to grow a new crop of pines from scratch," said the President. "101 may have its work cut out for it guarding its planting."

"Perhaps not," said Allen. "Our observer found that a number of the seeds had sprouted. Forestry experts tell us that such sprouting could not be expected this quickly. Our guess is that 101 treated the seeds in some way to speed up the sprouting process, probably to speed up the growth once they have started."

"Which poses another problem for us," said Whiteside. "Hundreds, if not thousands, of visitors taking over fields, planting them and then driving off the rightful owners. The farmers will be up in arms about that."

"To start with," said the President, "I had a queasy feeling about the visitors, a sort of gone-in-the-gut reaction. I think part of this, maybe all of it, was due to the fact that essentially I am a pure and simple political animal. I have political nerve endings. I twitch at every threat. I still realize that this business of the visitors, if I make one wrong move, could kill me politically. But, gradually, I have come to the belief that the two of us, we and the visitors, can get along together. They seem to think very much like us. If we could only communicate with them, I'm sure a solid understanding could be reached. The fact that 101 planted pine seeds re-enforces my thinking. The planting of a crop attests to a feeling for agriculture and the conservation of resources. In this way, too, their thinking parallels ours."

Allen started to speak, then hesitated.

"You were about to say something," said the President.

"That's right," said Allen. "I wondered if I should, but I guess

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there's no reason that I shouldn't. Perhaps of little significance, but to me intriguing. You remember when that first visitor came down at Lone Pine it landed on a car, crushing it."

"Yes, I do remember. There was no one in it, luckily. We wondered what became of the owner, why he, or she, never came forward."

"Exactly," said Allen. "We hauled in the car, if you recall."

"Yes, I do," said the President.

"Well, now we know. From the license plate. The owner is a young forestry student at the University of Minnesota. His name is Jerry Conklin. A few days after the incident, he came back to Minneapolis. So far as we can learn, he never told anyone about his car being totalled. He has not filed an insurance claim for the loss of the car. For a time, apparently, he acted fairly normally, but now that we have learned who he is, he has disappeared. The FBI is now looking for him."

"What do you expect to learn when you find him?" Whiteside asked.

"I don't really know. You have to admit, however, that his reaction has been strange. There must be some reason he told no one what happened. And it's strange that he has not filed an insurance claim. He has not even made an inquiry as to who hauled away his car. I can't get rid of the feeling that he may know something that could be helpful to us."

"When you find him," said the President, "and I suppose you will, go easy on him. From where I sit, he's committed no crime except to keep his mouth shut."

41. MINNEAPOLIS

The phone was ringing when Kathy came into her apartment.

She answered it, and then, "Jerry, where are you? You sound excited—or upset. I can't tell which. What is going on?"

"I've been trying to reach you," he said. "I called your apartment and your office. The office told me you were at Lone Pine and I tried Lone Pine. You had already left."

"I just got back," she said. "Just this minute. From the airport. Are you in town? You don't sound as if you're in town. Your voice is faint and there is noise on the line."

"I'm in Iowa. At a place called Dick's Landing. It's on the Mississippi, opposite what is called the Winnishiek Bottoms. You ever heard of that?"

"Not Dick's Landing. The Winnishiek, vaguely. I have heard it mentioned. What in the world..."

"Kathy, I went to that farm in Iowa. I talked with 101. It took me in again..."

"It remembered you?"

"I think so. We didn't really talk. It told me, it showed me. I got the impression that what it told me is important. But whether it is important to us or to 101 and the other visitors, I can't be sure."

"But Dick's Landing? And the Winnishiek?"

"It told me a location. Showed me

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where to go. I don't know what's here. Well, actually, I do—I know at least part of it. There's a place called Goose Island. Three of the visitors are there. But I don't know why it's important. I only know it is. That is what 101 impressed upon me. That I must go there. I want you with me, Kathy. If there is something important, you should be in on it from the first. You've been with this visitor story from the first."

"O.K.," said Kathy, "as fast as I can. I'll start out right now. Give me directions. Tell me how to get to this Dick's Landing. I'll be there in a few hours."

42. MINNEAPOLIS

For days, they had kept their vigil, but now the vigil ended. The group of Lovers who, on the day the visitor had landed on the airstrip, had fought their way onto the field, stood in stricken silence and watched the visitor slowly lift off the runway and sail away into the sky.

"We failed," said one of them, a gaunt young man with stringy hair and an aesthetic face.

"We did not fail," said the willowy girl who stood beside him. "It felt our love. I know it felt our love."

"But it made no sign. It did not take us up. It took others up..."

An airport guard, one of the many who manned the barricades that had been thrown around the visitor, said, to no one in particular, "Let's break it up. It's ended now. Why don't you all go home."

"Because we are already home," said the youth with the aesthetic face. "The Earth is home. The universe is home."

"I can't understand these kids," said the guard to a fellow guard. "Can you understand them? Christ, they been here for days, just hunkering down with the sappy expression on their faces."

"No," said the other guard. "I don't understand them. I never even tried to."

"Now let's clear out," said the first guard to the band of Lovers. "The show is over, folks. There's nothing left for you."

The crowd began breaking up, slowly drifting off the field.

"They should never have let them in," said the second guard. "It was against all rules. Someone could have gotten killed."

"There wasn't any danger," said the first guard. "The strip was closed. If they hadn't been let in, we'd had a running fight that might have gone on for days to keep them out of here. The commission thought this was the better way. I'll say this much for the kids; once they were let out here, they behaved themselves. They never caused trouble."

The second guard said, "They were loving it. They were showing it their love. Did you ever hear such goddamn foolishness?"

The other guard grunted in disgust.

By this time, the visitor was a small speck in the western sky.

In the *Tribune* newsroom, Gold put

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the phone back in the cradle. He said to Garrison, "The one on Highway 12 is gone, too. Lifted off and left about the same time as the one at the airport."

"Almost as if there were some sort of signal, telling them to go," said Garrison. "I wonder what it is they're up to."

"This is the second phase," said Gold.

"What do you mean—the second phase?"

"Well, the first phase was when they came and looked us over. They've finished with that. Now they're doing something else."

"How do you reach that conclusion?"

"I don't know, Johnny. I'm just guessing."

"Maybe they are finished with what they came to do. They may be going into space, forming up again, getting set to go off someplace else. This may be the last we will see of them."

Hal Russell, the wire editor, came shuffling up the room. He stopped at the city desk. "A story just came in on the wires," he said. "They're leaving everywhere. It's not only here."

Garrison said to Gold, "Why don't you phone Lone Pine. Find out what's happening there."

Gold picked up the phone and began dialing.

Garrison asked Russell, "Anything else? Any hints? Any speculation?"

"Nothing," said Russell. "Just that they are leaving. Those that have been around for days are leaving."

"Damn!" said Garrison. "How do you handle such a story? There's a story here. Someone has to dig it out and I'd like it to be us. I know there is a story, but how can it be gotten at?"

"Jay and Kathy," said Russell. "They're the ones who know the most about the visitors. They may have some suggestions."

"Kathy's not here," said Garrison. "She's off on some wild goose chase. Phoned me last night. Said she was onto something that might be big. Wouldn't tell me what it was. Said I'd have to trust her. Al will be pissed off. He practically ordered me to get her back from Lone Pine. And here she's

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Look over all your copies of Analog dated 1979. From them, pick your *three* favorites in *each* of the following categories: serial, novelette, short story, science fact article, and cover. (Please note that we've added a couple of categories.) Then drop us a line listing your favorites in each category, in order of preference. We'll tabulate the votes and let you know how they came out.

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gone again." Garrison sighed heavily.

He looked around the city room. "Where the hell is Jay?" he asked. "He's not at his desk. Is there anyone who might know where he is? How about you, Annie?"

The city desk secretary shook her head. "He's not signed out. I don't know where he is."

"Maybe he's in the can," said Russell.

Gold hung up the phone and said, "The visitors at Lone Pine have disappeared too. Some of the youngsters are still there, chomping at the bales."

"What does Norton think of it?" asked Garrison.

"I didn't talk with Norton. I talked with Stiffy. He's holding down the office. Norton is out of town. Took off this morning for a canoe trip into the primitive area."

43. WASHINGTON, D.C.

Porter waited for the members of the press to get comfortably settled, then he said, "I have no statement to make. I imagine that the most of you know that the visitors have disappeared. I would suspect that most of your questions will be aimed in that direction. I'll answer as I can, but I doubt I can be helpful."

"Mr. Porter," said the New York *Times,* "one possible answer that must have occurred to almost everyone is that our visitors have gone back into space, probably preparatory to proceeding somewhere else. Can you give us any indication if this might be true?"

"Mr. Smith, I can't," said Porter. "The same thought occurred to us. NASA is watching for any indication. Our space station is on the alert and so, I suppose, is the Soviet station. So far there is no word. But we must realize there is a large area up there to cover. The only possibility of seeing anything would be if the visitors formed into another mass, as was the case when they came to Earth."

"If the Soviet station saw something, would they communicate the information to us?"

"I can't be sure, of course. I rather think they would."

"Dave," said the Washington *Post,* "this may sound like a loaded question and I hope that you..."

"The *Post,*" said Porter, "never asks a loaded question."

An outburst of laughter drowned out the *Post.* Porter lifted a hand for silence.

"Go ahead," he said. "I'll stipulate, in advance, that it is not a loaded question."

"What I wanted to ask," said the *Post,* "is this: I think it is no secret that the appearance of the visitors posed some rather bothersome problems, political and otherwise, for the administration. Can you tell me if their disappearance might be of some relief to you?"

"I was wrong," said Porter. "This is a loaded question. However, I'll try to answer it with whatever honesty I can muster. It seems to me that we may be premature in assuming that the disappearance means we've seen

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the last of the visitors. There is a possibility they have only shifted their bases of operation to more remote areas. As to whether the administration would heave a sigh of relief at their going, the answer must be iffy. I can't deny the visitors gave us some occasion for worry. We had a problem dumped in our lap that no one had ever faced before. There was no precedent to serve as a guide for us in our dealing with them. We had some difficulty in assessing their impact on the various segments of the population. At times, I don't mind telling you, we were completely baffled. But I think that, over all, the situation was handled not too badly.

"This is one side of my two-part response. The second part is that after some days of dealing with the problem, we had fairly well come to the conclusion that our people could get along with the visitors and that there might be some benefit derived from them. I, personally, will feel rather strongly, if indeed the visitors are gone, that we are the poorer for their going. Perhaps there was much we might have learned from them."

"You say there was much we might have learned from them," said the Kansas City *Star.* "Would you care to amplify on that?"

"Only to point out," said Porter, "that in them we were in contact with an alien race from which we might have learned a new technology, might have gained some fresh perspective, might have learned of principles and ways of thought of which we, to this point, have been ignorant."

"Can you be more specific? Dr. Allen, for some days now, has been working on the dead visitor. Might not he have come up with some specific information that could be useful to us?"

"Nothing about which we can be certain," said Porter. "I told you a few days ago that the creature's structure is based on cellulose, but in a form with which we are unfamiliar, and with which, more than likely, we'll remain unfamiliar for some time. One possibility is that if we can learn the secret of this alien cellulose, the procedure by which the cellulose is changed into the bodies of the visitors, we may be able to utilize cellulose as a substitute for many of our decreasing nonrenewable resources."

"Back there a ways," said the Chicago *Tribune,* "you suggested the visitors might be changing their bases to more remote areas. By that, do you mean they are hiding out?"

"I didn't say that, Harry, and you know I didn't."

"But the implication appeared to be there. Why would you think they might be hiding out?"

"First of all, I didn't say they were hiding out. If they should be, my answer is that I have no idea."

"Mr. Porter," said the New York *Times,* "it would seem, on the surface at least, that it would be reasonable to assume the visitors may be putting a second phase of their operation into effect. First they came and spent some time observing us. Now they have

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made another move, disappearing, perhaps as a prelude to launching another..."

"Mr. Smith, you are asking me to speculate upon a speculation," said Porter, "and the only answer I can have to that is that I have no reaction. It is true that your speculation does seem to have some validity—as you say, on the surface at least. But I have no kind of information that would justify an answer."

"Thank you, sir," said the *Times*. "I thought it was a question that should be asked."

"I am glad you asked it," Porter told him.

"Dave, I think we should proceed with this further," said the Milwaukee *Journal*. "I think the point raised by the *Times* is a good one. I was about to ask a similar question. These things have looked us over. They may have a much better idea of what makes us tick than we can know, perhaps enough information to determine what their next step should be."

"I did not question the validity of the query, as Mr. Smith well knows," said Porter. "I agree that it is a consideration we should hold in mind. But with no information that would justify a response to it, I don't think I should try to answer it. There is only one objection to the viewpoint that I can think of. It makes it seem that the visitors are plotting against us, that they may have some hostile motive and are developing strategy to carry it out. So far, they have not been hostile."

"But we can't know what their motives may be."

"That is right. We cannot know their motives."

"Your phrase 'more remote regions' intrigues me," said the Los Angeles *Times*. "Mr. Secretary, are there all that many remote regions left in the United States?"

"I'm sorry now that I employed that phraseology," said Porter. "I think all of you are making too much of it. What I had in mind was that the visitors have disappeared from the more densely populated areas. They may begin to appear elsewhere, but, if so, we have no word of it. As to your question about remote areas, I should say there are still a lot of them. Vast forest regions still exist in New England, in northern Minnesota, Wisconsin and Michigan. There are similar areas in other states as well. In mountainous regions, particularly in the Rockies, there are a number of remote areas, which also is true of the southwestern deserts."

"It seems to me that you are convinced they've not actually disappeared, that they've not gone back to space," said the Washington *Post*. "Why do you seem so convinced of this?"

"I wasn't aware that my personal reaction was showing through so clearly," said Porter. "This is not an official position and if you use it, I hope you will make it clear it is not. My own thinking is that the visitors would be unlikely this soon to leave a planet where they've found the natu-

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ral resource they apparently were seeking. It is probable that not too many planets would be found where they could discover plant life that would produce as much cellulose as our forests do."

"So, having found it, you think they would stick around for a while."

"That is my thinking, not necessarily the administration's thinking."

"Throughout this entire visitor situation," said the INS, "the administration has maintained what I think can be described as a hopeful, perhaps even an optimistic, mood. There must have been many trying times for you, but still you always seem to have struck that note of optimism. Can you tell me if the thinking is as optimistic as it seems?"

"What you are trying to ask," said Porter, "is whether the optimism you say you detected was merely a political optimism or was it real?"

"Thank you, Dave, for completing my question for me."

"I think," said Porter, "that under any circumstance, the tendency might have been to remain optimistic for purely political reasons. But I can tell you, without quibble, that a true feeling of optimism has existed. The visitors did not act in a hostile manner. It appeared to us that they were trying to determine how they should act toward us. Almost never did they violate any of our basic rules of conduct. It seemed that they were trying to be decent. I think the feeling existed in the White House that they would not willingly do anything to harm us. It is possible, of course, that they might harm us unwittingly."

"You seem to be saying you think that would be unlikely."

"Yes," said Porter, "I do think it would be unlikely."

44. IOWA

For more than half an hour, they had fought their way through a waterlogged jungle—trees, vines and brush. The ground was uneven and treacherous underfoot, mounds and ridges of semisolid ground separating narrow runnels of open water and small stretches of swamp. There was, as yet, no sign of the grassy prairie, slightly elevated above the outer rim of the island, that Jimmy Quinn had told them they would find once they had beat their way through the encircling timber area.

Occasionally, when the towering trees thinned out slightly, they caught a glimpse of one or two of the visitors that apparently were resting in the grassy interior. They had first seen them coming down the river, once Goose Island had come into view.

"They are still there," Quinn had said. "I thought they might have left. There was something on the radio this morning about the visitors all leaving."

Finally, they seemed to be traveling up a slight incline. The going became easier. There were no longer any of the swampy areas and the underbrush was thinning out, although the trees grew as heavily as ever.

"I think we're almost there," said

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Jerry, more to himself than to Quinn.

And, finally, they were there. They came out of the trees and before them lay the vast extent of grassland. As they came out into the open, both of them stopped abruptly, staring in wonderment.

The three visitors sat in the clearing, at some distance from one another, but it was not the visitors that riveted their attention.

Interspersed between the visitors, standing in neat, straight rows, were cars, or what appeared to be cars. They were shaped like cars. They had doors and seats and steering wheels and in the front of each of them a single, flaring headlight. But they had no running gear.

"Cars," said Kathy. "Jerry, those are cars but they haven't any wheels."

"Whatever they are," said Jerry, "they are still making them, or building them, or budding them, or whatever you may call it."

The sight of the long straight rows of cars had so fastened Kathy's attention that she paid but slight attention to the visitors. But now, when she looked, she saw that all three were in the process of budding, although the buds were not the shapes that they had been when the visitors had been producing young. Rather the buds were elongated and lumpy.

A bud burst open on the visitor that was nearest them and from it began to emerge one of the things that looked like cars. It gleamed wetly, but as she watched, the wetness dried, revealing a glossy yellow sheen.

"It's a yellow one," said Jerry. "Did you notice that the cars are of different colors. Reds and greens and greys—all the colors you could ask."

Slowly the yellow car emerged from the bud and finally dropped off. It came to rest, floating a few inches above the ground. Quickly, it swung about and scooted swiftly toward the nearest line of cars. It swung precisely into line and halted, stationing itself next to a green car. On the other side of the green car was a red one.

"How cute," said Kathy, delighted. "They come in every color."

"I was just telling you that," said Jerry, "but you didn't listen."

"Those can't be cars," said Kathy. "I know they look like cars, but they just can't be. What would the visitors want with cars?"

"I wouldn't know," said Jerry, "but they do look like cars. Futuristic cars. Like the pipe dream of a car designer who is intent on catching the public eye. They haven't any wheels, of course, but they don't need wheels; they float. These cars, if that is what they are, must operate on the same principle as the visitors themselves. They should because they are children of the visitors, but in a somewhat different shape."

"Why should they be budding children in the shape of cars? Why would they want youngsters in the shape of cars?"

"Maybe," said Jerry, "because they are really cars and are meant for us."

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"For us?" Her tone was skeptical.

"Think, Kathy. Think about it. The visitors came here and found what they were looking for. They found trees from which they could process cellulose. It may be that these cars are payment for the trees."

"That's ridiculous," said Kathy. "Why pay us anything? They came and found the trees and took them. They could just keep on taking them. And for us, you said. We don't need this many cars. We couldn't use them in a lifetime. There must be a hundred of them, maybe more than that."

"Not just for us. Not just for you and I. For the people of the country."

"They couldn't make enough of them."

"I think they could. There are just three visitors here. They have been here for less than a week. In that time, they've budded more than a hundred cars. Take a thousand visitors, or ten thousand visitors, give them six months..."

"I suppose you're right," said Kathy. "They could make a lot of cars. Come to think of it, 101 told you to come here. She knew what you'd find. She wanted you to find them."

"Probably not 101 alone," said Jerry. "The visitors wanted us to find them. 101 was just the spokesman. Each one of these things, more than likely, knows what the rest of them are doing. A sort of hive communication. When 101 first landed, she sent out signals to the others. They can talk among themselves."

"You think the visitors want us to spread the word about the cars."

"We are being used," said Jerry. "That must be it, we are being used. We are the PR people for the visitors. We may be a test team as well. I don't know. Maybe they want us to see if the cars can be operated in a satisfactory way. They can't be sure, perhaps. They know a lot about us, but maybe they aren't sure that they know enough. When a car manufacturer designs a new model, the model must be tested..."

"And they picked you because you are a special person to them," Kathy said. "You were the first to be inside one of them, to communicate with them. Maybe the only person. These stories of other people taken up may be only..."

"101 shook hands with you. You're forgetting that."

"Yes, but how could 101 be sure I'd be here with you? How could she know you'd phone me?"

"Maybe she didn't. Maybe..."

"Maybe what?"

"Kathy, these things could be smarter than we possibly could guess. They could read us like a book."

"Suddenly," said Kathy, "I feel all shivery inside. I've never been afraid of them before, but now I am afraid. I have the feeling it could be a trap. Some sort of trap that we are falling into, not even knowing we are falling into it."

"A trap, perhaps," said Jerry, "and, yet, they are making cars for us. Cars that can float, that possibly can fly. No need of roads; they can go

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anywhere. They'll need no gasoline. They may last forever, never need repair. Giving them to us as payment for the trees. As payment for the cellulose that will allow them to have young again, averting racial death. If you were facing racial extinction, wouldn't you make cars—or anything they wanted—for the race that saved you?"

"You're way ahead of me," said Kathy. "I can't accept the thought that these are actually cars and that they are being made for us. You talk as if you're sure. How can you be so sure?"

"Maybe from something that was told me by 101. Something I didn't know at the time, but am realizing now. It makes sense, I tell you. It is reasonable. They have had a look at us. They have seen what it is we want. They read us, Kathy. They know the kind of things we are. They know how to buy us. They know what we'll sell our souls for and..."

"You sound bitter, Jerry."

"Not bitter. Just realizing what is happening. And that we can't stop it. Even if we turned around and walked away. We couldn't stop it. Someone else would find the cars. And maybe it's right that the cars should be found. Maybe in the end it will work out right. But they're too smart for us. The human race is a Yankee trader and we have met our match."

"We have stood here, talking," Kathy said. "We've tried to talk ourselves into believing a sort of fairy tale. All we've done is talk. I still can't think that they are cars. I can't be sure they're cars."

"Let's go," said Jerry, "and see if they really are."

45. MINNEAPOLIS

It was Gold's day off and Jay, coming back to the newsroom from a late lunch, stopped by the city desk and sat down in Gold's chair. Garrison was hunched over his desk, idly making doodles on a sheet of copy paper. Annie sat in her corner. She had finished a sandwich she had brought as her lunch and now was peeling an orange, making an artistic job of it.

"Anything happening?" Jay asked the city editor.

Garrison shook his head. "Nothing here. Nothing anywhere else, I guess. Hal tells me the wires are coming up empty, so far as the visitors are concerned. There have been reported sightings in Texas and Montana, but they've not been confirmed."

"We wait," said Jay. "That is all we can do. We did all we could. We phoned dozens of people in the state. Please let us know if you hear anything. Editors of weekly papers, sheriffs, mayors, businessmen, friends of ours. If they hear anything, they will let us know."

"I'm trying to think," said Garrison. "There must have been more that we could have done."

"It's not your problem, Johnny. Not yours alone."

"I know, but dammit, I would like to be the one who found the answer. Some little clue as to where the visitors

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may have gone."

"And why they went."

"Yes, I know. But that can come later. First, we have to find them. Something to put out on page one. My guess would be northern Minnesota, up in the wilderness area. They may be hiding out there..."

"Or Canada. Or the Pacific Northwest," said Jay. "There is a lot of wild country they could be holing up in."

The city desk phone rang. Annie put down the orange and picked up the receiver.

"It's for you, Johnny," she said. "It's Kathy. She's on three."

Garrison clawed for the phone, signaling Jay to pick up Gold's phone.

"Kathy, where the hell are you? What you got?"

"I'm in Iowa," Kathy said. "Place called Dick's Landing. On the Mississippi. I'm with Jerry."

"Jerry?"

"Yes, you remember. The big oaf I was going to go to the concert with. That time you bought the tickets."

"Yes, I remember. What's all this got to do with you being down in Iowa?"

"We found three of the visitors, Johnny. On Goose Island..."

"To hell with the rest of it. The visitors. What about the visitors? What are they doing?"

"They are making cars."

"Kathy! Don't kid me. Don't make any jokes. I've had a hell of a day so far. I can't stand any more."

"They are making cars. We have two of them. We flew them from the island. I have a yellow one and Jerry has a red one. They're easy to handle..."

"You said flew. You flew a car?"

"You can fly them. They haven't any wheels. They float, like the visitors float. They're not hard to operate, once you get the hang of it. It took the two of us no more than an hour or so to find out how to run them. There are things you push. Like having a plane. And there is no danger. If you're about to run into something, they veer off. Without you doing anything, they veer off..."

"Kathy," said Garrison, icily, "tell me the truth, for Christ's sake. You really have these cars?"

Jay spoke into the phone, "Kathy, this is Jay. I'm on the line with Johnny. This is no joke, is it? You really have the cars?"

"You're damned right we have them."

Garrison said. "Kathy, get hold of yourself. You're not making sense. What are they making cars for?"

"We don't really know," said Kathy. "We can't be sure, that is. We think they may be making them as payment for the trees they took. But we don't really know; it's only what we think. It seemed to be all right with them when we flew off with the two we have."

"And now that you have them..."

"We'll be coming back. Be there in three or four hours. Maybe faster. We don't know how fast these things can go. We'll fly them. Not bother with the roads. We'll follow the river

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north, and cut down on travel time."

"Oh, Jesus, Kathy, this can't be right. Making cars, you say..."

"Well, I don't know if you can really call them cars..."

"Just a minute, Kathy," said Jay. "Hang on for a minute."

He took down the receiver and then cupped the mouthpiece, looking across the desk at Garrison.

"Johnny," he said, "she's a good reporter. A damn fine reporter."

Garrison cupped his phone. "I know, but Christ, I can't go along with this. What if it turned out wrong?"

"It's five hours to press time. She'll be here by then. She can write her story. We can get pictures of the cars. We can get it all nailed down."

Garrison nodded. He uncupped the phone and spoke into it. "All right, Kathy, we'll be waiting for you. We won't do a thing until you get here. We'll have photographers. Can you land those things on top of the building, on the roof?"

"I don't know. I would think we could. They handle easy."

Jay spoke into the phone. "Kathy, how are these cars powered? Do you need gasoline? What do you need?"

"Nothing," Kathy told him. "The visitors bud them. They are powered in the same way the visitors are powered, however that may be. Jerry thinks they are actually visitors, but in the shape of cars. There are a hundred of the cars, maybe more. We took only two. They bud them fast. The three visitors have been on the island only a week. Three of them made more than a hundred cars in only a week, probably less than a week."

"All right," said Garrison. "We'll sit on it. We'll keep it quiet. So far the story is ours exclusively. We'll see it stays that way. Be careful. Don't take any chances. We want you here in one piece."

"I'll be seeing you," said Kathy.

Garrison cradled the phone and looked at Jay.

"What do you think?" he asked.

"I think we've just bought the first iron hatchet to replace our stone tomahawk."

Garrison mumbled something under his breath, then said, "Yes, I remember you talking about that. We should have run the story when you brought it up."

"I can still write it."

"No," said Garrison. "Hell, no, everyone will be writing that story now. Now there is another story to write. What happens to the auto industry if the visitors keep on making their cars and giving them away in payment for the trees—enough of them for everyone in the country? What happens to all the people who lose their jobs in the Detroit factories and in other plants? What happens to the oil industry when no one needs to buy gasoline for their cars? What happens to the auto service and maintenance people, all the service stations and the people pumping gas? What happens when we don't need to build roads any more? What happens to the finance companies that live on

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car payment plans? And what happens when the visitors, once they have made enough cars to give everyone a car, turn to making refrigerators and stoves and furnaces and air conditioners? How will the states register the new cars, the free cars? How will they regulate them? How do they go about taxing them? And the hell of it is that the visitors are not doing this out of animosity. They have no animosity toward us. All they have is gratitude. If they had only worked with the government, gone through government channels..."

"More than likely," said Jay, "they don't even realize there are governments. They may not know what a government is. They probably have no political concept. They have looked us over and found out how best they can pay us for the trees. And they looked at people and not at governments. They probably are unaware of what they are doing to us, not knowing anything about the complex economic structure we have built. The only economic system they may know is simple barter. You give me something; I'll give you something in return. And the hell of it is that the people will buy it. Once the people know about the free cars, once they start getting their hands on them, no one, in government or out, will dare to lift a finger, say a word, against the visitors."

"And that's why they're hiding out," said Garrison. "So they can make cars without interference. Hiding themselves so hordes of people can't come charging in to pick out a car. Thousands of them out there making cars. How long do you think it will take them to make enough of them?"

"I wouldn't know," said Jay. "I'm not even sure you're right, but the guess is good. I hope to God it's only cars. We probably can weather the situation if cars is all they make."

46. WASHINGTON, D.C.

"Dave," asked the President, "can we be absolutely certain the news reports are right? It all sounds so fanciful. Almost beyond belief. What I mean...a few facts blown out of context."

"I had the same reservation," said Porter, "when the first report came on the wires. So I went to the source. Called the *Tribune* in Minneapolis and talked to the city editor. Man by the name of Garrison. I felt a little foolish doing that, almost as if I were questioning the integrity of the paper. But I felt I had to do it. Garrison was quite decent..."

"And the reports are correct?"

"Basically, yes. Garrison told me he couldn't believe it himself to start with. Not until the two cars landed. Said that after his reporter's phone call, he sat there in a daze, saying over and over to himself there was something wrong, that he had misunderstood what the reporter had said, that there had to be some foul-up."

"But now he knows. Now he's sure?"

"Now he knows. He has the cars.

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He has pictures of them."

"Have you seen the pictures?"

"It was less than half an hour ago the *Tribune* went to press. The story caught everyone, the news services included, by surprise. It would take a while to get the photos from the *Tribune*, a while longer to transmit them. They should be coming in soon."

"But cars," said the President. "Why, for Christ's sake, cars? Why not something really fanciful? Why not diamond necklaces? Cases of champagne? Fur coats?"

"The visitors are good observers, sir. They have been watching us for days..."

"And they saw a lot of cars. Almost everyone has one. Those who don't have one want one. Those who have an old car want a new one. Old cars. Beaten-up cars. Worn-out cars. Accidents on the road. People killed and cars demolished. The visitors saw all this. So they gave us cars that never would wear out, that need no gasoline, that need no roads, that can never crash because they veer off when there is the danger of a crash, no maintenance, no repairs, no paint job..."

"We can't be sure of that, sir. That's a speculation."

"A car for everyone?"

"We can't be sure of that, either. That's what Garrison thinks. That's what his reporter thinks. As I understand, however, the *Tribune* story is very careful not to say that, although the implication's there."

"It can wreck us, Dave. Whether there is a car for everyone or not, it can blow the economy to hell. Because the implication, as you say, is there. I'm thinking of calling a moratorium, a financial holiday. Shutting down the stock market, the banks, all financial institutions, no financial transactions of any kind at all. What do you think?"

"It would give us time. That might be all it would give us. And a few days only. You couldn't make it stick for more than just a few days."

"If the market opens tomorrow morning..."

"You're right. Something has to be done. You'd better talk to the attorney general, the federal reserve. Probably some other people."

"Time might be all that it would give us," said the President. "I agree with that. But we need some time. We need some elbow room. Give people a chance to think things over. A chance for us to talk with people. I told you the other day I felt there was no reason for panic. Goddammit, Dave, I'm close to panic now."

"You don't look it."

"Panic is something we can't afford. Not visible panic. Politics gives you a long training in the control of personal panic. Right now my gut is jumping, but I can't let it show. They'll be coming out of the woodwork to crucify us. Congress, the press, business interests, labor leaders, everyone. All of them claiming we should have foreseen this situation, should have been doing

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something to head it off."

"The country will live through it, sir."

"The country, but not me. It does beat hell how things turn out. Up until now, I figured I had it made for another term."

"You still may have."

"It would call for a miracle."

"All right. We'll carpenter up a miracle."

"I don't think so, Dave. Not that we won't try. We'll have to see what happens. Allen and Whiteside will be joining us. Grace is trying to locate Hammond. I want his input. A sound man, Hammond. He can handle the mechanics of the financial holiday. We'll have to have Marcus over later. There'll be others coming in. God knows, I need all the advice that I can get. I want you to hang in close."

"After a while, I'll have to have a briefing. The boys are already pounding on the door."

"Hold up for a while," said the President. "Maybe in a couple of hours, we'll have something to give them. Go out now, empty, and they'll maul you to death."

"They'll maul me, anyhow. But it's a good idea to wait a while. I'm not looking forward to it."

The box on the President's desk beeped. When he answered, Grace said, "General Whiteside and Dr. Allen are here."

"Show them in."

The two came into the room and were waved to chairs. "You've heard?" asked the President. "It was too involved to try to tell you when I spoke to you."

They nodded.

"Car radio," said Allen.

"TV," said the general. "I turned it on after you phoned."

"Steve, what do you think of it?" asked the President. "There seems to be no question the visitors are making cars. What kind of cars would they be?"

"As I understand it," said the science advisor, "they are budding them. They bud their young, forming them in the images of themselves. I suppose there's nothing to stop them from budding in the image of cars."

"Some of them ate some cars," said Whiteside. "In St. Louis, I believe."

"I'm not too sure that has anything to do with it," said Allen. "Certainly, they probably could analyze the cars once they ingested them, but the cars they are budding apparently are similar only in external features to our manufactured cars."

"Then why did they snap up the cars in St. Louis?" asked the general.

"I wouldn't know," said Allen. "All I know is that the cars the visitors are budding are visitors. Not actually cars at all, but visitors in the shape of cars, apparently capable of being used as cars. They are biological, not mechanical vehicles."

"The reporter who found the cars," said the President, "seems to think, at least she suggests, the cars are being budded out of gratitude. A free will offering to the people of the planet that supplies their cellulose."

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"About that I wouldn't know," said Allen. "You are talking about how these damn things think. On that I couldn't even hazard a guess. We've been studying the one that died for days and we have not even the slightest idea of its anatomy, of how it manages to live and function on the physical level, let along the mental. The situation is analogous to a medieval man trying to understand how and why a sophisticated computer works. Not one single organ that can be compared to a human organ. We are completely baffled. I had hoped we might be able to determine what caused the creature's death. In this we have failed. Until we find how the organism functions, there's no chance of pinning down the cause of death, or of anything else, for that matter."

"You'd say, then," said the President, "there is no chance to communicate with them. If we could somehow talk with them, even in sign language or something, or..."

"Not a chance," said Allen. "No chance at all."

"What you are saying," said Whiteside, "is that we have to sit and take it. This car business. Detroit down the drain. Detroit and a lot of other places. The military has contracts..."

"If the visitors had only come to us," said the President. "If they only would have come and tried to let us know what they intended..."

"By us, you mean the government," said Allen.

The President nodded.

"What everyone fails to realize," said Allen, "is the true, utter alienness of these creatures. They are more alien than can possibly be conceived. I figure them for a hive organism, what one knows or sees or feels all the rest of them know as well. Such a society would have no need of a government. They would never have thought of it. They wouldn't know what a government was, because there never was a need of them to develop the governmental concept."

"We have to do something," said the general. "We have to protect ourselves. We need to take some action."

"Forget what you are thinking," said the President. "You told me, in this office, a few days ago, the visitors

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could withstand anything short of a nuclear blast. That was your calculation, you said. We can't use nukes..."

Allen straightened in his chair. "Then there was a weapons test," he said. "I kept hearing about it, rumors about it. But, surely, I thought, if there had been one, I would have been informed. Tell me, why wasn't I informed? Your findings might have thrown some light..."

"Because it was none of your damned business," said the general. "Because it's classified."

"Even so," said Allen, "it might have been important and you should have..."

"Gentlemen, please," said the President. "I apologize for the slip of the tongue. It's all my fault." He looked at Allen. "You never heard it, of course," he said.

"No, Mr. President," said Allen, "I never heard a word that was said."

"The fact remains," said the President, "that we can't use nukes..."

"If we could get all the visitors herded together," said the general, "then, maybe..."

"But we can't do that," said the President. "We don't even know where they are—or, at least, not the most of them. Probably scattered all over the country. Hiding, making cars..."

"Sir, you can't be sure of that."

"Well, it's a logical assumption," said the President. "It's understandable. They couldn't sit out in plain sight, making cars. The people avid to get cars, would rush in and swamp them." No one spoke for a moment.

"Maybe," said Whiteside, grasping for hope, "they may run out of trees. They must have to eat a lot of trees to make cars."

"That would be unlikely," said Allen. "There are a lot of trees in North America. And should they begin running short of them, there still would be the rest of the world, including the equatorial jungles. And don't forget they'll be growing trees to replace those they eat. Number 101 planted the field in Iowa."

"That's another thing that worries me," said the President. "If they start using too much farmland to grow trees we might run into a food shortage. I know we have large amounts of wheat in storage, but that would be soon used up."

"The danger there would be," said Allen, "that if there were a food shortage, the visitors might start making food. Our people, in effect, would be placed on a dole system."

"While all this is interesting," said the President, "and perhaps even pertinent, it is getting us nowhere. What we should be talking about is what we should be doing now."

"I just now thought of something," said Porter. "When I talked with Garrison, he mentioned a name. Jerry Conklin, I believe. Said Conklin was the one who really was the first to learn about the cars, but that he objected to being identified, so his name was not mentioned in the story. It seems to me I've heard that name before. It seems to ring a bell."

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Allen came to rigid attention. "Of course, it does," he said. "That's the man whose car was crushed when the first visitor landed at Lone Pine. The one that disappeared when we tried to find him. And here he pops up again. This strikes me as rather strange."

"Perhaps we should bring him in and have a talk with him," said Whiteside. "It's just possible this young fellow knows some things he should be telling..."

"Wait a minute," said Allen. "We found out something else. Conklin is a friend, apparently a close friend, of a reporter for the *Tribune*. Kathy, I think was the first name."

"Kathy Foster," said Porter. "She was the one who found the cars, who wrote the story."

"Maybe we ought to have them both in," said Whiteside. "Ask the FBI to pick them up."

The President shook his head. "Not the FBI," he said. "We'll act civilized about it. We'll invite them as White House guests. We'll send a plane to pick them up."

"But, sir," the general protested, "this man has disappeared before, he could disappear again."

"We'll take our chances on that," said the President. "Dave, will you make the call?"

"Gladly," Porter said.

47. MINNEAPOLIS

A copy aide, bent sidewise under a heavy load of papers clutched beneath one arm, tossed a copy on Garrison's desk, then hurried on.

Garrison picked up the paper, unfolded it, glanced swiftly across the front page. It was not greatly changed over the first edition, except for the new article that had not been written when the first edition had gone to press. He laid the paper down on his desk and admired the new story. It had a two-column head and an artist's sketch of the control panel of the visitor-car. He read the first paragraph:

If you should become one of the lucky ones to get your hands on a visitor-car early, there need be no concern about its operation. Handling it is a simple matter, easily understood. To start it, you depress the first button on the panel to your right. (The button marked A on the artist's sketch.) To cause it to move forward, depress button B. Speed is controlled by rotating the dial above the control panel, to the right for higher speeds, to the left for slower. All the way to the left to stop. Elevation is controlled by the lever to right of the panel. To rise, push it up; to descend, push it down. The buttons, the dial and the elevator lever are unmarked, nor are they graduated. You must get clear in mind what each control will do. Since there are few of them, the operation is not difficult...

Garrison let his eyes go down to the final paragraph:

It might be a good idea to clip this story and the diagram, putting the clipping in your billfold or purse. So that if, some morning, you find one of the cars parked in your driveway...

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Garrison said to Gold, "This was a good idea. It relates the reader directly to the cars. It's something everyone will read. I'm glad you thought of it."

"Well, hell," said Gold, "it's time I began to earn my salary."

Hal Russell came loping down the aisle. He stopped before the city desk and said to Garrison, "More of the visitors have been spotted. One bunch in Idaho. Another of them in Maine."

"All making cars," said Gold.

"All making cars," said Russell.

"They're beginning to surface," said Garrison. "By this time tomorrow, we'll have spotted a fair number of them."

"Thing is," said Russell, "people are out there looking for them."

"They have reason now to look," said Gold. "A new car in everyone's garage."

"The next big story," said Garrison, "will be the delivery of the cars. People waking up and finding them parked in their driveways."

Gold shook his head. "It might not happen that way. Maybe drawings will be held to see who gets the cars. A sort of nationwide lottery. Or maybe they'll just be dumped out in a field or in vacant city lots and let the people fight for them. A car to the fastest and the meanest."

"You have some damn strange ideas," Garrison told him.

"For myself," said Gold, "I want a robin's egg blue car. My wife never let me have one. We've always had red cars. She likes red."

"Maybe there'll be enough of them," said Russell, "that you both can get one—you a blue one and your wife a red."

"In that case," said Gold, "we'll have two reds. She'd never let me have a blue. She thinks blue is sissy."

"Have either of you figured out the mathematics on this?" Garrison asked. "Could the visitors really make that many cars? Have we ever had a solid figure on how many of them there are?"

"I don't think a solid figure," Russell said. "Several thousand, I would guess. According to Kathy, three of them made more than a hundred cars in less than a week. Say it was a week. That's more than thirty cars a visitor. Put five thousand of them at it and that's a hundred and fifty thousand cars a week. The figure could be higher, but, even so, that's more than a quarter million cars a month."

"Our population is two hundred fifty million," said Gold.

"You wouldn't be making cars for everyone. A lot of those two hundred fifty million are babies and kids underage. You wouldn't give them cars. And remember all those baby visitors who are growing up. In another year, maybe in another six months, they could be making cars. As I remember it, the babies were pupped in fairly large litters. Say an average of ten babies to every visitor. In a year's time, say, several million cars a month."

"All right," said Garrison. "All right. I guess it could be done."

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"And then," said Gold, "they'll start making beer. They could make beer a lot faster than cars. Say a case a week for every male adult. A case a week would be about right, I'd judge."

"Hot dogs," said Russell. "And pretzels. They'd have to make hot dogs and pretzels to go along with beer."

The phone rang. Annie answered it. "It's for you," she said to Garrison. "On two."

Garrison stabbed a button and picked up his phone.

"Garrison. City desk."

"This is Porter at the White House," said the voice on the other end. "I called you earlier."

"Yes, I remember. What can I do for you?"

"Does Miss Foster happen to be around?"

"I'll look and see."

He rose, with the phone in hand, located Kathy at her desk. He waved the phone above his head. "Kathy," he bawled. "A call for you on two."

48. WILDERNESS AREA

Norton steadied the canoe with choppy paddle strokes, staring at what the bend in the river had revealed. There, straight ahead of him, five masses of square blackness loomed above the deep green of the pines.

Visitors, he told himself. What would visitors be doing here, deep in the wilderness? Although, once he thought of it, he realized it might not be strange at all. More than likely many of the big black boxes had landed in areas where they would not readily be found.

He chuckled to himself and dipped the paddle deep, driving the canoe toward shore. The sun was dipping toward the western horizon and he'd been looking for a place to camp. This place, he told himself, would do as well as any. He'd beach the canoe and look over the visitors. After that, he'd build a fire and settle for the night. He was surprised to find that he was pleased at finding the visitors. There was, he thought, something companionable about them—as if unexpectedly he had come upon some neighbors whose existence he had not suspected.

He hauled the canoe up the shelving, pebbly beach and strode into the forest, heading for the visitors. There was, he thought, one strange thing about it—not the strangeness of finding the visitors here, but the fact that there was no racket. They were not sawing down or ingesting trees. More than likely they had processed all the cellulose they needed, had budded young and now were simply taking it easy, a time for resting once their chores were done.

He burst into the clearing they had made and skidded to a surprised halt. In front of him stood a house. It was a somewhat lopsided house, leaning drunkenly to one side, as if the builder had done a poor job of it and it had come unstuck. Just beyond it stood a second house. This one stood four-

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square, but there was still a certain wrongness to it. It was a moment before he could make out what the wrongness was, and then he knew—it hadn't any windows.

Beyond the houses stood the visitors, so closely ranged together that they gave the impression of a group of great buildings clustered in a city's downtown district.

Norton stood undecided and confused. No one in their right mind, he told himself, would have come into this wilderness, build two houses, then go away and leave them. Nor would any builder construct a lopsided house and another without windows. And even if the hypothetical builder had wanted, for some unfathomable reason to do so, he would have had no reasonable way in which to transport his materials to the building site.

The pines moaned softly as the wind blew through them. On the other side of the clearing in which the houses and the visitors stood, a small bright bird flickered for a moment against the green wall of the encircling conifers. Other than the sound of the wind in the pines and the bright flash of the bird, the place stood unmoving and silent. The stillness and the brooding somberness of the primeval forest overshadowed all, serving to blot out and soak up even the wonder of the houses and the visitors.

With an effort, Norton uprooted himself and moved toward the first of the houses, the lopsided one. The front door was open, but it took him a moment to decide to enter. It was entirely possible, he thought, that the structure might collapse once he stepped inside of it. But he finally took the chance and went into the hall, which opened into a kitchen and what appeared to be a living room. He went into the kitchen, walking softly because he was afraid of jarring the house and hastening its collapse. Despite the house's structural oddity, the kitchen seemed quite normal. An electric stove and refrigerator stood against one wall. Starting at the stove and running around another wall were cabinets, with counter top, drawers, dish cupboards and a sink.

Norton turned a dial on the stove and held a palm above the burner. The burner heated quickly and he turned it off. At the sink, he turned a faucet and a small trickle of water ran out of the tap, then stopped. He turned the faucet further and the tap sputtered. Water finally gushed out, but again it stopped. He turned off the faucet.

He went into the living room and everything seemed all right except that the windows were set into the wall at an unusual angle. Down the hall he found three bedrooms and they seemed to be all right, although there were certain small peculiarities in the dimensions of the rooms that puzzled him. Thinking about it, he found himself unable to say exactly what was wrong.

It was with a sense of relief that he stepped out the front door and headed for the second house—the one that had no windows. There was something—something rather star-

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tling—that puzzled him about the lopsided house and he wondered what it was. Not the canted windows in the living room nor the odd dimensional qualities of the bedrooms, nor even the faulty faucet in the kitchen. It had been something else and it was important. Walking toward the other house and thinking about it, he suddenly knew what it was that had bothered him so deeply—the lopsided house didn't have a bathroom. He stopped short and pondered it. Could he be wrong? It was incomprehensible that someone should build a house and not put in a bathroom. Carefully he ran through an inventory of the rooms and was sure that he was right. He could not have overlooked a bathroom; if one had been there, he'd have seen it.

The front door of the second house was closed, but it opened easily and smoothly when he turned the knob. Because of the lack of windows, the interior of the house was dark, but not so dark as to interfere with vision. Swiftly he checked the rooms. There were four bedrooms and a den, a kitchen, a living room and dining room —and two bathrooms, one off the master bedroom. The floor in the first house had been of wood; here all the floors were carpeted. Drapes hung on the walls where windows should have been. He tried the kitchen appliances. They worked. The stove top heated when he turned on the burners, at the sink the water ran; when he opened the door of the refrigerator a gush of cold hit him in the face. In the bathrooms, the taps ran normally and the toilets flushed.

Everything seemed perfect. But why should someone build a perfect house and then forget the windows?

Or had someone built it?

Could the visitors . . .

He gulped at the idea and suddenly went cold.

If it were the visitors, then it did make sense. No human would have built two houses in the middle of a wilderness. To start with, it would have been all but impossible to do it.

But the visitors? Why would the visitors be building houses? Or practicing the art of building houses? For it was quite apparent that these were practice houses, constructed by someone who was not entirely clear on the matter of how houses should be built. The lopsided house probably had been the first one to be tried. The house in which he stood most likely was the second, considerably improved over the first one, but still lacking windows.

He stood, shaken, in the middle of the kitchen, still not certain, questioning himself. The only answer, reluctant as he might be to accept it, was that the two houses had been fabricated by the visitors. But that left a second, even more puzzling, less easily answered question: Why should the visitors be building houses?

He groped his way out of the kitchen and across the living room, went into the hall and let himself out the door.

Long shadows had crept across the

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clearing. The tops of the picket fence of pines to the west cut a saw-toothed pattern into the reddening sun. A chill was beginning to move in and Norton shivered at the touch of it.

He ran his hand over the siding exterior of the house and it had a strange feel to it. Peering closely at it in the deepening dusk, he saw that it was not siding, not separate lengths of lumber, but that the exterior seemed to be moulded in a single piece, like a preformed plastic.

Slowly he backed away from the house. Superficially, except for the lack of windows, there was nothing wrong with it. It was an almost exact copy of the kind of house that could be found in any suburb.

He ran his gaze from the rooftop down to the basement wall—and there was no basement wall. It was a detail that had escaped him—this lack of a basement wall. The house hovered half a foot or so above the ground, suspended in the air.

Suspended, Norton told himself, as the visitors were suspended. There was no question now—no question of how the houses had come into being.

He walked around the corner of the house and there they stood, the visitors, clumped together, like a massed group of darkened buildings standing in the center plaza of some futuristic city, the lower half of them blotted out in the forest dusk, the upper half highlighted by the dying rays of a setting sun.

From their direction came another house, floating along a foot or so above the ground, the whiteness of it ghostly in the twilight. As it approached, Norton backed away, apprehensively, ready to break and run. The house came up, then stopped, as if to determine its position. Then slowly, majestically, it wheeled into line with the other houses and came to a halt, the three of them standing in a row, somewhat closer together, it was true, than would be the ordinary case, but very much like three houses sitting on a street.

Norton took a slow step toward the third house and as he did, lights came on inside of it, with the windows gleaming. Inside it he saw a table in the dining room, set with glass and china and two candlesticks, with tall tapers in them waiting to be lighted. In the living room, the screen of a TV set glimmered and across from it stood a davenport and all about the room were chairs, with a curio cabinet, filled with dainty figurines, ranged against one wall.

Startled, he moved to turn away and as he did, he caught the hint of shadows, as if someone were moving in the kitchen, as if there was someone there taking up the dinner to be brought to the waiting table.

He cried out in terror and spun about, racing toward the river and the canoe that waited there.

49. WASHINGTON, D.C.

When Porter rang the bell, Alice came to the door. She seized him by the arm, hurried him inside and closed the door behind him.

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"I know," he said. "It's an ungodly hour and I haven't got much time. But I wanted to see you and I must see the Senator."

"Daddy has the drinks all poured," said Alice, "and is waiting for you. He's all a-twitter as to why you should come running out to see us in the middle of the night. You must be knee-deep in matters of importance."

"A lot of motion," Porter told her. "A lot of talk. I don't know if we're getting anywhere. You've heard about the business holiday?"

"A late bulletin on TV. Daddy is all upset about it."

But the senator, when they came into the room where he was waiting for them, was not visibly upset. He was quite the genial host. He handed Porter a drink and said, "See, young man, I didn't even have to ask. I have learned your drinking preference."

"Thank you, Senator," said Porter, accepting the glass. "I stand in need of that."

"Did you take time to eat tonight?" asked Alice.

He stared at her, as if astonished by the question.

"Well, did you?"

"I'm afraid that I forgot," said Porter. "It did not occur to me. The kitchen did bring up something, but, at the time, I was with the press corps. It was all gone when I got back."

"I suspected it," said Alice. "Soon as you called, I made some sandwiches and started up the coffee. I'll bring in something for you."

"Sit down, Dave," said the senator, "and say what you have in mind. Is there some way I can help the White House?"

"I think there might be," said Porter, "but it's up to you. No one will twist your arm. What you might want to do about it is a matter for your conscience to decide."

"You must have had some rough hours down there," said the senator. "I suppose it is still rough. I'm not sure I agree with the President on his financial moratorium, but I do realize there was a need of some sort of action."

"We were afraid of what the snap reaction might be," said Porter. "The holiday will give some level headed men the time they'll need to head off total panic."

"The dollar is going to take a beating on the foreign exchanges," the senator told him. "No matter what we do, it will hit near bottom. By tomorrow afternoon, it might be damn near worthless."

"We can't do anything about that," Porter said. "Give us the chance to win a round or two back home and the dollar will climb back. The real danger that we face is right here—the Congress, the press, public opinion."

"You mean to fight it out," said the senator. "I think that's the only thing you can do. Not back down. Not give ground."

"We're hanging in there," said Porter, grimly. "We are not about to say that we were wrong in the handling of the visitor situation. We'll make no

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apologies." His voice was firm.

"I like that," said the senator. "Much as I may disapprove of some of the things that have been going on, I do like this show of strength. The way things are tonight, we need strength at the core of government."

Alice brought in a plate of sandwiches and a cup of coffee, set them on a table beside Porter's chair.

"You go ahead and eat," she said. "Don't even try to talk. Daddy and I will do the talking. We are full of talk."

"Especially my daughter," said the senator. "She is fairly bursting with it. To her this business is not, as it may be to the rest of us, a great calamity. She sees it as a chance at a new beginning. I don't think I need to say I am not in agreement with her."

"You are wrong," she told her father. "And you," she said to Porter, "probably think the same as he. The both of you are wrong. This may be the best thing that ever happened to us. It may shake some sense into our national consciousness. Shake us loose of the technological syndrome that has ruled our lives for the past hundred years or so. Show us that our economic system is too sensitive and shaky, built on a foundation that basically is treacherous. It may demonstrate to us that there are other values than the smooth operation of machines..."

"And if it did turn us around," the senator interrupted, "if we are freed from what you like to call the tyranny of technology, if you had a chance for a new beginning, what would you do with it?"

"We'd end the rat race," she said. "The social and economic rat race. We'd work together for mutual goals. We'd bring an end to the intensely personal competition that is killing us. Without the opportunities for the personal advancement that our technology and the economic system on which it is based encourages, there'd be slight incentive to cut the throat of another person to advance ourselves. That is what the President is doing, although he may not know he's doing it, by calling for the holiday for business. He'll give the business world and the public a breathing spell to grope their way back to sanity. Just a little way back to sanity. If they could have a longer time..."

"Let's not you and I argue about it now," said the senator. "At some later time, I will discuss it with you."

"With all your pompous smugness," said Alice. "With your ingrained conviction..."

"Dave must get back," said the senator. "He's needed at the White House. He has something weighing on his mind."

"I'm sorry, dear," she said to Porter. "I should not have intruded. Can I listen to what you have to say to the Senator?"

"You never intrude," said Porter, finishing his second sandwich. "And, yes, I wish you would listen to what I have to say. Don't hate me too much for it. I might as well be frank. The White House wants to use the

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Senator."

"I don't like the sound of it," said the senator. "I dislike being used, although I suppose it is a part of politics—to use and to be used. What is it, specifically?"

"We can survive," said Porter, "or we think we can, if we can keep the Hill off our backs for a little time. Time is all we ask. No great accomplishment. Just a few days time."

"You have your own people up there," said the senator. "Why should you come to me? You know that it has been seldom I've played ball with you."

"Our people," said Porter, "will do what they can. But this particular piece of business would smell of dirty politics. With you handling it, it won't."

"And why should I help you? I've fought you down the line on almost every piece of legislation that you have sent up. There have been times the White House has been moved to speak most harshly of me. I can't see how there can be any common interest."

"There is the interest of the nation to consider," Porter told him. "One of the outcomes of what has happened will be an increasing pressure on us to call for outside help. On the grounds that the situation is not solely national, but international, and that the rest of the world should be in there working with us. The U.N. has been screaming about this from the very start."

"Yes, I know," said the senator. "I disagree with the U.N. It's none of their damn business."

"We have too much at stake," said Porter, "to let that come about. I'd like to make an allusion to something that is confidential, top secret. Do you want to hear it?"

"I'm not sure I do. Why should you want to tell me?"

"We need a rumor started."

"I think that's despicable," said Alice.

"I wouldn't go quite as far in my reaction as does my daughter," said the senator, "but I feel somewhat the same. Although I do not in the slightest blame you personally. I take it you're not talking for yourself."

"You must know I'm not," said Porter. "Not exclusively for myself. Although I would take it kindly..."

"You want to feed me something so that I can leak it—a very careful leak in exactly the right places, knowing full well that I'm the one who'd know where such a leak would have maximum impact."

"That's a rather crude way of saying it," said Porter.

"Dave," said the senator. "This discussion essentially is crude."

"I have no objection to the words you use," said Porter. "I would not have you soften them. You can say no and I'll get up and leave. I'll not argue with you. On my part, there'll be no ill will involved. I'm instructed specifically not to argue with you, not to urge you to any action. We have no pressure we can put on you. Even if we had it, it would not be used."

"Daddy," said Alice, "despicable

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as it all may be, he's being honest with you. He's playing dirty politics in a very forthright manner."

"We were talking a few nights ago," the senator said, "about the advantages we might glean from the visitors. I admitted to some enthusiasm over the possibilities of gravity control. I said if we could get that..."

Porter shook his head. "It's not that, Senator. I don't want to mislead you. Nor to trap you. I've tried to be aboveboard with you. I've confessed that we want to use you for a leak. A word from you to certain people on the Hill, just a casual word is all..."

"A casual word, you call it."

"That is all. To a couple of well-selected people. We won't name them. You choose them for yourself."

"I think I know," said the senator. "You don't even need to tell me. Now, answer me one thing."

"Yes, of course," said Porter.

"Has there been a weapons test?"

"Yes, there has been. The results are classified."

"And in such a case we must hold tight control of the visitors."

"I would say so, sir."

"Well, now," said the senator, "on close examination it seems to me my conscience is quite clear. And my duty plain to see. You have told me nothing, naturally. Just a slight slip of the tongue, of which I took no notice."

"In that case," said Porter, "I shall be getting back." He said to Alice, "I thank you for the food."

"The both of you," said Alice, "are despicable."

50. THE UNITED STATES

There was talk at breakfast tables.

"Herb, I always told you. Some good, I said, would come of the visitors. I always told you that, but you didn't think so. And now they'll be giving us free cars."

"There ain't nothing free. Not in this world, there ain't nothing free. You pay, one way or another, for everything you get."

"But the paper says so."

"The paper doesn't know. That's just what the paper thinks. The piece in the paper says it might be so. I won't count on no free car until I see it standing in the driveway."

"And it doesn't need any gasoline. It doesn't even need a road. You can fly it if you want to."

"There'll be bugs in it. Just you wait and see. There's bugs in all new models. And this flying business. Just try to fly it and you'll break your neck."

"You never believe nothing. Nothing good, that is. You're just a cynic. All you believe is bad. The paper says the visitors are doing it out of gratitude."

"Just tell me, Liza, what I've ever done for a visitor. Why should they feel gratitude to me? I ain't turned a hand to help one."

"Not gratitude to you, Herb. Not to you personally. Anyone you ever helped would die of shock. No one expects you to be any help at all. They'd

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fall down dead if you were any help. The visitors feel grateful to all of us just because we're here, just because we live on this planet. They want to do something for us. Not just for you, but for everyone."

There was talk in the ghetto streets.

"Hey, man, you hear about them cars?"

"What cars?"

"Them cars the visitors are about to give us."

"Nobody gonna give us cars."

"It says so in the paper."

"Not us, man. Maybe some honkeys will get some cars. We won't get no cars. All we'll get is screwed."

"Maybe it'll be different this time. Them visitors are different kinds of folk. Maybe they won't screw us."

"Listen, man, get rid of that idea. Everybody screws us."

And in an assembly worker's home in a Detroit suburb:

"Joe, you think it's true about the cars?"

"I don't know. How should I know? It's just what the paper says. The paper could be wrong."

"But if it isn't wrong? What if it isn't wrong? What if there really will be cars?"

"Christ, Jane, how should I know?"

"You would lose your job. A lot of people would lose their jobs. Ford and Chrysler and all the other companies can't go on making cars if there are free cars being handed out."

"The visitor-cars might not be any good. Run for a while and stop and once they stop, what do you do for repairs? They're just some new-fangled idea. Maybe some new advertising gimmick. I don't think the visitors are making them. Someone else is making them and some PR jerk has cooked up this story to attract attention. Some day them PR people will carry things too far and maybe this is it."

"You can't lose your job, Joe. We can't afford to have you lose your job. There's the house payments and the car payments and the kids need winter clothes."

"Don't worry so much, Jane. There have been all these flashy foreign cars and the assembly line keeps running."

"But these aren't foreign cars, Joe. And they are free."

"There ain't nothing free," said Joe.

There was subdued panic in the banks, in the board rooms, in the unmanned brokerage offices. In a surge of selling on foreign exchanges, the dollar dropped spectacularly. The British and French governments scheduled a hurried joint consultation. The West German government officially called for support of the United States by other nations of the world. Strange stirrings took place behind the Kremlin walls, but foreign correspondents, even the old Moscow hands, had only a confused idea of what might be going on.

On Capitol Hill, in Washington, out of a flurry of meaningless motion, some sentiment developed for the

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drafting of a bill that would make it illegal for citizens to accept any sort of gifts from aliens. And a rumor grew...

"What do you know about this report that there has been a weapons test?" Senator Knox asked Senator Davenport when the two met just outside the chamber.

"Very little," said Davenport. "I just now got wind of it."

"How it got out, I don't know," said Knox. "It's supposed to be top secret."

"There may be nothing to it," said Davenport.

"I can't believe that to be true," said Knox. "It seems to be authentic. I'm beginning to think we should back the administration on this visitor issue. No matter how we stand on other matters. If we've got something from the visitors..."

"I'm inclined to go along with you," said Davenport. "Seems to me we should stay hanging in there. Although, I still am not too sure how much credence to give the rumor."

"Just on the chance that it is true," said Knox, "I would favor doing what we can. In the area of national security, we can't let the country down."

On a small river in the wilds of Minnesota, Frank Norton bent to the paddle, heading for the bridge where he had parked his car.

51. WASHINGTON, D.C.

The science advisor said to Jerry Conklin, "You, Mr. Conklin, tell a fascinating story."

"I came here to tell it," said Jerry, "under protest. Had it not been for Kathy and Garrison at the *Tribune*, I would have refused to come. They persuaded me that by coming here I would be performing a public duty. So I came and now I've told what I have to tell and it's up to you. I don't give a damn if you believe it or not."

"Mr. Conklin," said the President, "no one here has indicated disbelief. For myself, at this point, I'm ready to believe almost anything."

"I'd like to point out," said Porter, "that the story is much more than fascinating. I think, Dr. Allen, that you made an extremely bad choice of words. What Mr. Conklin tells us does explain one thing—how he was able to go straight to the location where the cars were being made. No one else knew or could have told him. The old river rat knew the visitors had landed on Goose Island, but he didn't know what they were doing there. You couldn't have paid him enough to go and find out. He was scared spitless of them."

Allen said, "I did not mean to seem to doubt what he said."

"It sounded to me as if you did," said Jerry.

Whiteside rumbled at Jerry, "I would say, young man, that it took a fair amount of guts to sit down and tell us what you have. You had decided to keep quiet about it and I can understand why you did. I think I would have done the same."

"What he has told us, essentially, is that a sort of communication with the visitors is possible," said the Presi-

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dent, "but a one-sided conversation and on the terms of the visitor. A visitor, when the necessity arises, can have some limited conversation with us, but we can't with them."

"I told 101 to tone down its communication," said Jerry, "and, apparently, it understood."

"Did you try to talk further with it?" asked the President.

"Certainly, sir. I asked it why it showed me where to go, what I would find there, why it wanted me to go."

"And it didn't answer you?"

"Not only didn't it answer; it also threw me out. But this time not as violently as was the case the first time when it heaved me out into a tree. This time it set me down, rather gently, on the ground."

"This time it apparently wanted to be sure you would be able to go where it wanted you to go."

"I would suppose so, Mr. President, but I don't think that's all of it. The first time, I was only an alien organism, along with other alien organisms, that it wanted to have a look at. The second time I was—I was about to say an old friend, and that's not it, of course. More like an acquaintance. Someone it knew. Someone it could use."

"Possibly one that it could use again."

"I'm not sure about that. I can tell you this; I'm not going to hunt down 101 again."

"If we asked you to?"

"What the hell would be the use of it?" asked Whiteside. "He has told us what the score is. We don't ask it; it tells us. As it stands, there'd be no possibility of establishing conversation. It talks to us, if you can call it talking, but we don't talk to it."

"There have been stories," said the President, "of other people being taken up."

"I think you can discount those stories," said Allen. "For years, people have been telling about being taken up by the UFOs. So far as can be determined, it has largely been cult stuff, all of it self-serving. What these people claim the UFOs have told them is so unimaginative, such fuzzy thinking and patently such human thinking that, instinctively, you know it's a fabricated human story. If you really communicated with an alien, the result would not come out uniquely human. The concepts of such a conversation probably would be mind-boggling, which perhaps is an understatement. A large part of what one heard would not be understood."

"So you think all the taken-up tales now are either cult imagining or downright lies?" asked Porter.

"Certainly," Allen told him. "I'm convinced that Mr. Conklin is the only one who has been taken up. What he tells us fits the pattern of alien communication." He said to Jerry, "There were no words. I think you said there were no words."

"That's right," said Jerry. "Only pictures in my mind. At times, thoughts in my mind, but I couldn't tell if they were my thoughts or were something else."

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"Well, let's say you went back to 101 again. You say you won't and I don't suppose you will. But let us say you did. Do you think it would take you up again?"

"Only if it had something that it wanted to tell me," Jerry said. "Only if there were a chore it wanted me to do."

"You're convinced of that?"

"Utterly convinced. I feel very keenly that it used me."

"And, yet, Miss Foster tells us of the handshake she got from 101."

"It was more than a handshake," said Kathy. "More personal than a handshake. A kiss, perhaps. I didn't realize what it was at the time. I thought, first a handshake, for that was the easiest way to characterize it. A handshake of gratitude, of thanks, of recognition maybe. To let me know that it knew I existed and was there. But now I know it was more than that. It was, I am sure, a sign of real affection. I think that impression is reenforced by their making of the cars. They're not just showing off. Not trying to awe us or impress us. Not threatening us with a demonstration of what they can do. Not even paying us for letting them eat our trees. It's a show of deep affection for us. Maybe like Santa Claus. Maybe like giving a special friend a birthday gift. Like a young man buying roses for his girl."

"You make a good case for them," said the President. "And yet, if this keeps on, it will ruin us."

"Let's say, Mr. President, that a fond parent buys candy for her child," said Kathy, "not knowing, never having been told, what candy may do to a child's teeth. It's the same with the visitors. It's not knowing, that is all. They're only trying to be nice, not aware of what their niceness does to us."

"Miss, that may all be true," said Whiteside, "but they got me scared. I still think that a few well-placed. . ."

"Henry," the President said, sharply, "not now. Later, if you insist on talking about it, but not now."

"Let's get back to this business of taking up," said Allen. "To talk with someone, it appears, they have to take a person up. Mr. Conklin, can you think of any way they might be persuaded to take up—say, myself, or the President?"

"They wouldn't take you up," said Jerry. "They simply would ignore you. No matter what you did, they'd pay no attention to you."

"I would think that you are right," said Allen. "They're good at doing that. They've ignored us ever since they came. I have found myself wondering just how they perceive us. I've rather thought at times that they might see us as charming pets or as pitiful forms of life they must be careful not to step on. But, actually, I sense it's neither one of these. Miss Foster seems to think they have affection for us. After all, we allowed them to land on the planet where there was cellulose to save them from racial extinction. The cellulose allowed them to have young and if there had been no young, I would suppose the race final-

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ly would have died. If we give them human emotions, which I doubt they have, they then would feel gratitude. With all due respect to Miss Foster's viewpoint, I can't feel they're all that thankful. The point is that there is no way we can stop them from chopping down our trees. I am inclined to believe they have, rather than gratitude, an irrepressible business ethic, although they would not think of it as that. I know I phrase this clumsily. I think they are obsessed with making full and honest payment for anything they take. I think that's what they are doing."

"To sum up," said the President, "there does seem to be an outside chance that given time, we might be able to talk with our visitors. But it will take time, apparently, an awful lot of time, and more patience than we have. The one thing we haven't got is time. Would the others of you say that is a fair assessment?"

"I subscribe to it," said Whiteside. "That's the whole thing, all wrapped up, and we haven't got the time. Our time is all run out."

"We can weather it," said the President, as if he might be talking to himself. "We've got to weather it. If nothing else happens, if it's no more than the cars, we can muddle through. I have had some encouraging phone calls from leaders in the business world and the Congress seems more inclined to go along with us than I had thought they would." He said to Porter, "I take it, from what I hear, that you talked with Davenport."

"Yes, I did," said Porter. "A friendly interchange."

"Well, then," said the President, "I think this does it. Unless," he said, looking at Kathy and Jerry, "you have something else to add."

They shook their heads.

"Nothing, Mr. President," said Jerry.

"We thank you for coming to see us," the President told them. "You have done us a very useful service. Now we can see more clearly the problems that we face. You may rest assured that nothing you have told us will go beyond this room."

"I'm grateful to you for that," said Jerry.

"The plane is waiting for you," said the President. "We'll drive you to the field any time you wish. Should you wish to remain in Washington, however, for a day or two..."

"Mr. President," said Kathy, "we must be getting back. I have my job and Jerry has his thesis."

52. MINNEAPOLIS

"This place feels like a wake," said Gold. "We're hip deep in news of great significance. The whole damn world going down the drain. The dollar almost worthless. Foreign governments howling doom. All the diplomats tight-lipped. The business community white-faced. The kind of stuff we thrive on. Yet where is all the joy of a newsroom bristling with news, where all the jubilation?"

"Oh, shut up," said Garrison.

"The White House expresses con-

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fidence," said Gold. "Says we will see it through. There's a prime example of whistling down a dark and lonely street."

Garrison said to Annie, "You have any idea when Kathy and Jerry will be getting in?"

"In another couple of hours," she told him. "They're probably taking off right now. But Kathy will have nothing for us. She told me when she called there'd not be any story."

"I expected that," said Garrison. "I had hoped, of course..."

"You're a blood sucker," Gold told him. "You suck your people dry. Not a drop left in them."

"It's not working out the way it should," said Annie.

"What's not working out?" asked Garrison.

"This business with the visitors. It's not the way it is in pictures."

"By pictures, I suppose you mean the movies."

"Yes. In them it works out right, but just in the nick of time. When everyone's given up every hope and there seems no chance at all. Do you suppose that now, just in the nick of time..."

"Don't count on it," said Gold.

"Look," said Garrison, "this is the real thing. This is really happening. This is no fantasy dreamed up by some jerk producer who knows, in his secret, stupid heart that happiness is holy."

"But if they'd just talk to us," said Annie.

"If they'd just go away," said Gold, and he shook his head slowly.

The phone rang.

Annie picked it up, listened for a moment and then took it down and looked at Garrison.

"It's Lone Pine," she said. "Mr. Norton. On line three. He sounds funny. There's something wrong up there."

Garrison grabbed his phone off the cradle. "Frank," he said, "is there something wrong? What is going on?"

Norton's words came tumbling along the line. "Johnny, I just got back from my trip. I looked at the papers on my desk. Can it be true? About the cars..."

"I'm afraid it is," said Garrison. "Take it easy, Frank. What has you so upset?"

"Johnny, it's not only cars."

"Not only cars? What do you mean, not only cars?"

"They're making houses, too. Trying to make houses. Practicing at making houses."

"You mean houses people could live in?"

"That's right. Like the kind of house you live in. The kind of houses a lot of people live in."

"Where are they doing this?"

"Up in the wilderness. Hid out in the wilderness. Practicing where they thought no one would see them."

"Take a deep breath, Frank, and tell me. Start at the beginning and tell me what you saw."

"Well," said Norton, "I was canoeing up the river..."

Garrison listened intently. Gold sat

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motionless, watching him closely. Annie picked a file out of a desk drawer and began buffing her nails.

"Just a minute, Frank," Garrison said, finally. "This is too good a story, too personal a story for someone else to write. What I'd like you to do is write it for us. From the personal angle, just as you told it to me. First person all the way. I saw this, I did that, I thought something else. Can you do it? Would you do it? How about your own paper?"

"My own paper won't be out for another three days," said Norton. "Hell, I may even skip a week. Gone like I've been, I have little advertising. I have a couple cans of beans stashed on the shelf. Even if I skip a week I still can eat..."

"Sit down, then," said Garrison, "and start writing it. Three or four columns. More if you think you need it. When you're done, pick up the phone and ask for the city desk. Dictate the story. We have people who can take it down almost as fast as you can read it. And, Frank..."

"Yes?"

"Frank, don't spare the horses. Spread your wings."

"But, Johnny, I didn't tell you everything. I was just getting to it. In that last house, the one that was lighted up and had furniture..."

"Yes, what about it?"

"The house had just floated in. The visitors had just finished making it. But when I looked at it, I saw shadows in the kitchen. Moving shadows. The kind of shadows someone would make as they moved about the kitchen, taking up the dinner. I swear—I tell you, Johnny, there were people in that kitchen! For the love of Christ, are they making people, too?"

53. DE SOTO, WISCONSIN

The South Dakotan who had nursed his dilapidated car for more than five hundred miles, the machine rattling and banging, coughing and gasping, every wheeze threatening to be its last, pulled into the small town of De Soto, a wide place in the road hemmed in between bluff and river. He tried to find a place to park, but there was no place left in the town to park. The one long street was jammed with cars and people, and there seemed to be much angry shouting and running about, and the frightening, sobering thought crossed his mind that possibly all the people here had also come for cars.

Finally, he was able to pull his car over to the side of an indifferent gravel road that ran eastward up a coulee out of town. Many other cars had been pulled off the same road. He did not find a place to park until he was a good half-mile beyond the last house in the village. He got out of the car and stretched in an attempt to ease his aching muscles. Not only did his muscles ache; he was tired to the very bone, almost to exhaustion. He was tired and hungry and he needed sleep and food, but not until he got his car. Once he got his car, he could take the time to sleep and eat.

Just how to go about getting a car

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he had no idea. All he knew was that there was an island across the river from this town and that the cars were on the island. Perhaps, he thought again, he should have driven to Dick's Landing in Iowa, but the map had shown what looked to be small secondary roads leading to the landing. He had decided that he could make better time if he drove to this Wisconsin town that lay opposite Dick's Landing. Somehow, he knew, he had to get across the river to reach the island. Perhaps he could rent a boat. He wondered how much the renting of a boat might cost and hoped it would not be too exorbitant. He was carrying little cash. Maybe, he thought, he could swim the river, although he was not too certain that he could. He was a fairly decent swimmer, but from what he had seen of the river on his long drive down the valley, the Mississippi was wide and the current was strong.

He plodded down the road, skirting potholes, the loose gravel sliding underneath his feet. Ahead of him, several men were walking down the road, but he made no attempt to catch up with them, for now that he was here, he found himself surprisingly abashed. Maybe he shouldn't have come, but, at the time, the idea had seemed simple and flawless. God knows, he needed a car and here was a way to get one. Not for a moment had it occurred to him that others would come up with the same idea. He could not know, of course, but he suspected that the others in the town had come on the self-same errand. There was one consolation, however: there should be plenty of cars to go around. The story he had heard on TV said that at the time the visitors on the island had been found, they had made more than a hundred cars. It was reasonable to suppose that since the report, they had kept on making them, so there would be more than the hundred now. Maybe a couple of hundred. Maybe more than that. There were a lot of people in town, but surely with more than two hundred cars sitting there and waiting, there'd be plenty to go around. The big problem would be to find how to cross the river, but he'd deal with that when the time came.

He came to the outskirts of the village and continued trudging toward the business district, which fronted on the river. Perhaps there, he could find someone who would tell him what to do. By this time, some sort of procedure might have been worked out for picking up a car.

A knot of people stood on the sidewalk in front of a bar and he drifted over to them. Three highway patrol cars were standing across the street, but there was no sign of the troopers who had been in them. A line of men were standing on the far side of the railroad track that arrowed between the town and river. Their backs were turned toward the town, as if they were watching something on the river.

The South Dakota man plucked apologetically at the sleeve of a man standing on the sidewalk. "Has there been an accident?" he asked, motion-

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ing at the patrol cars.

"There ain't been no accident," said the man. "One earlier in the day, but not within the last few hours."

"Well, what are the troopers doing here?"

"You must have just pulled in," said the man.

"That's right. Drove all the way from South Dakota. Rapid City—well, not really Rapid City, but a little town just east of Rapid City. Made it all in one run; only stopped for gas."

"Sounds like you were in a hurry."

"Well, you see, I wanted to get here before all the cars were gone."

"There ain't none of them gone," said the man. "They're all over on the island."

"So I'm still in time."

"Still in time for what?"

"Still in time to pick up a car."

"You ain't going to pick up no car. There ain't no one going to pick up a car. State troopers, they got the river sealed off. Some word has it they may be sending in the Guard. They're out in boats patrolling on the river so no traffic can come up or down the stream."

"But why? The TV said..."

"We all know what the TV said. And the papers, too. Free cars for everyone. But you can't get across the river to the island."

"That the island over there?"

"Somewhere over there. I don't know just where. There are a lot of islands over there."

"But what happened? Why did the troopers..."

"Bunch of damn fools piled into a boat. More of them than the boat would carry, but they kept on piling in. The boat swamped out in mid-stream. Most of the damn fools drowned."

"But someone could set up some kind of system, some safe way to get across and..."

"Sure, they could," said the other man, "but no matter what you did, it wouldn't work. No one here has got a lick of sense. Everyone has got his heart set on one of the cars. The police are right. They can't let no one near the river. If they did, more people would get killed."

"But don't you want a car?"

"Sure, I want a car. But there's no chance to get one now. Maybe, later on..."

"But I have to have a car right now," said the man from South Dakota. "I just got to have one. I don't think that heap of mine will last to get me home."

He ran across the street and up the embankment to the railroad track. He reached the line of men who stood on the far edge of the track, pushing his way through them, shoving them aside. One foot hit the downslope of the embankment. Skidding on sliding gravel, he lost his balance. He fell and rolled down the slope, stopping just short of the water's edge. Lying there, he saw a huge man in uniform towering over him.

The trooper asked, almost gently, "Where do you think you're going, son?"

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"I got to have a car," said the man from South Dakota.

The officer shook his head.

"I can swim," said the South Dakotan. "I can swim it easy. Let me have a chance. Let me take a chance."

The officer reached down a hand, jerked him to his feet.

"Now, you listen to me," he said. "I'm giving you a break. Get your tail up over that track. If I so much as catch sight of you again, I'll toss you in the cage."

The South Dakotan hastily clambered up the embankment. The crowd jeered kindly at him.

54. MINNEAPOLIS

"How sure can we be of Norton?" Lathrop asked. "He's not one of our staff."

"I'd stake my reputation on him," said Garrison. "Frank and I go a long ways back. We went to school together, have been in touch ever since. He's a dedicated newspaperman. Just because he chose to hide away up at Lone Pine doesn't make him any less a newspaperman. We act as if we were specialists here—some of us write the news, others edit it, still others make up the pages, and there are a few who write editorials. Each one to his own task. Frank does the whole damn thing. He starts each week with nothing and he pulls the news and advertising together, he edits what he writes, he makes up the paper. If there is need for an editorial any particular week, he writes the editorial and not only that..."

"No need to go on, Johnny," Lathrop told him. "I just wanted to know how you felt about it."

"If Frank tells me he saw evidence the visitors are making houses," said Garrison, "then I'll believe they're making houses. His story hangs together, he has a lot of detail."

"It seems incredible to me," said Lathrop, "that we have this one exclusive. That makes two in a row. We had the cars and now we have the houses."

"There's something I want to talk with you about," said Garrison. "I think we should let the White House in on it before we go to press. I've talked to the press secretary there. He seems a decent man. I can get through to him."

"You mean you want to tip them off," said Lathrop, somewhat horrified. "Tell them about the houses. Why, Johnny? Just why in hell..."

"My thinking may be wrong," said Garrison, "but it seems to me the administration is absorbing a lot of punishment and..."

"It's good for them," said Lathrop. "The bastards have it coming. Not on this visitor matter—they've done fairly well on it. But they've been willfully wrong and pigheaded on most other things. A good dose of humility won't do them any harm. I can't seem to summon up much sympathy."

Garrison was silent for a moment, considering, trying to put his thoughts together.

"It's not the administration so

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much," he finally said, "as it is the nation. The White House is being stiff-necked about it; they're determined to ride the crisis out. Maybe they can do it. Maybe they had a chance of doing it before the houses came up. But the houses will wreck them. The cars are bad enough, the houses..."

"Yes, I can see that," said Lathrop. "The implication is there. Houses as well as cars. First the automotive business, now the housing industry. The dollar will be worthless. Our credit will be gone. But still we have to run the story. Even if we wanted to, and we don't, it's something that can't be covered up."

"There's no question about publishing," said Garrison. "We have to do that. The question is: Do we give our own government a chance to react to it before we let them have it straight between the eyes? Maybe, if they knew, they would have the time to shift their stance, stand on more solid ground to deal with it when it broke."

"The whole idea," said Lathrop, "is that we should go international on it. I'm not sure that's the right thing to do. After all, we have taken the brunt of this alien invasion. If there are to be any benefits or advantages because of it, they should go to us. The visitors chose us; we didn't invite them in, we didn't lure them in. Why they chose us, I don't know. I don't know why they didn't land in Europe or in Africa. But the U.N. has been yelling ever since it happened..."

"I don't know about that, either," said Garrison. "It would gall me to see it go international, but international or not, however we may go, I think the administration should be given a few hours to reconsider on the basis of new developments. They'll handle it better if they have some advance warning. They may elect to stand pat, tough it out. I don't know. You and I don't have to decide that. Our problem is a different one. We talk about our responsibility in dealing with the news. We think of ourselves as a public service institution. We do nothing willingly to harm or debase our cultural system. We talk a lot about digging out the truth and reporting the truth and that's an easy one in those cases where we can determine truth. But there is something else that goes beyond mere truth. And that's the power we hold. We have to use that power as wisely as we can. If we keep this bottled up for the sake of another scoop..."

"Dammit, Johnny, I want another scoop," said Lathrop. "I love them. You can't get too many for me. I roll in them with great delight. How can we be sure the White House wouldn't leak it? There are no secrets in Washington unless someone has slapped a confidential stamp on it."

"They would be unlikely to leak it," said Garrison. "They'd want to keep it quiet until they could figure out what to do, what action they should take. As soon as it is known, there'll be hell let loose. They'll need all the time we can give them. They'll be no more anxious to leak it than we are."

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"Well, I don't know," said Lathrop. "About letting Washington in on it, I don't really know. Let me think about it, talk with the publisher."

55. ABOARD PLANE APPROACHING MINNEAPOLIS

"Everyone is determined to make them ogres," Kathy said to Jerry. "Nasty little ogres that came down out of the sky to do mischief to us. But I know they aren't. I touched 101—I don't mean touched just her hide, but the inside of her, the living spirit of her. It wasn't just a touch; it was a contact. And when I told the President about this, he was interested—most interesting, he said. But he wasn't interested, nor were any of the others. All they can think of is their precious economy. Sure, they want to know if there is some way they can talk with the visitors. But the only reason they want to talk to them is to tell them to stop what they are doing."

"You have to understand the President's position," Jerry told her. "You have to realize what the administration is facing..."

"Has it ever occurred to you, or to anyone," she asked, "that the President could be wrong, that all of us are wrong. That the way we live is wrong and has been wrong for a long, long time."

"Well, certainly," said Jerry. "All of us, everyone. We all make mistakes."

"I don't mean that," said Kathy. "It's not being wrong right now, but wrong from a long way back. Maybe if we could go back far enough in time, we might be able to pinpoint where we started going wrong. I don't know enough history to even guess where that particular time of going wrong might be, but somewhere along the time track, we took the wrong turning, started going down the wrong road and there was no way of going back.

"Just a few weeks ago, I interviewed a bunch of crazy kids at the university, real far-out freaks who called themselves Lovers. They told me love was everything, the be-all and the end-all, that there was nothing else that counted. They looked at me out of wide, round innocent eyes with their naked souls shining through their eyes and I felt sick inside. I felt as naked as their souls were naked. I felt pity for them and was enraged at them, both at the same time. I went back and wrote the story and I felt sicker and sicker all the time I was writing it, for they were wrong, disturbingly wrong. They were far off the beaten track, so far out there was a sense that they were forever lost. But, maybe, they are no more wrong than we are. The thing is that we've gotten so accustomed to our wrongness that we think it's right. All-love may be wrong, but so is all-money, all-greed wrong. I tell you, Jerry..."

"You think the visitors may be trying to kick us back on the right track?"

"No, I guess not. No, I never really thought that. They wouldn't know

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what is wrong with us. Maybe if they did know, they wouldn't care; maybe they'd think it was our business to be wrong. They themselves may be wrong in what they are doing. Most likely they are. But what they are doing, wrong or right, may be showing up our wrongness."

"I think," said Jerry, "that, in any case, under any circumstance, it might be impossible to say what is wrong and what is right. We and the visitors are far separated. They came from God knows where. Their standard of behavior—and surely they must have such a standard—would be different from ours. When two cultures with differing standards collide head-on, one of them, or perhaps the both of them, will get roughed up. With the best intentions on both their parts, there will be some roughing up."

"Poor things," said Kathy. "They came so far. They faced so much. They dared so greatly. We should be friends of theirs but we'll end up hating them."

"I don't know about that," said Jerry. "Maybe some people. The men in power, in any sort of power, will hate them, for they'll take away the power. But with the new cars, and perhaps other things, the people, the great faceless mass of people, will be dancing in the streets for them."

"But not for long," said Kathy. "They'll finally hate them, too."

56. WASHINGTON, D.C.

"With this new information," said Marcus White, secretary of state, "I think it might be time to realign our thinking."

John Hammond, White House Chief of Staff, asked Porter, "Just how solid is this information? Should we check further on it?"

"I would think we might be checking on it," said Porter.

The President stirred uneasily in his chair. "Dave is right," he said. "We are checking on it. We have men in Lone Pine. Norton will guide them in. The National Guard is flying in a helicopter to take the party in. Everything is being kept under cover. The Guard doesn't even know why the copter's going in. We'll soon know if the information's right."

"I think you can count on it being right," said Porter. "I've had some previous contact with Garrison at Minneapolis. He's a solid citizen. Remember, the man didn't have to tip us off. He had an exclusive story; he could have stayed sitting on it."

"Then why didn't he stay sitting on it?" demanded Whiteside.

"He was giving us a break. Said he felt it was only right that we should have some warning, thought we'd probably need some time to get our feet planted under us before he went to press."

"He pledged you to secrecy?" asked Whiteside.

"Not in so many words. He said he assumed we would protect him. I told him that we would. And I assume we will. It's in our interest as well as his. Once this thing breaks, we had better have some idea of what we should be

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saying and doing. We need the time he gave us."

"I don't like it," said Whiteside. "I don't like it one damn bit."

"You don't have to like it, Henry," said the President. "None of the rest of us likes it, either."

"That's not what I meant," said Whiteside.

"I know it isn't what you meant," said the President. "I was putting a charitable interpretation on what you said."

Allen, the science advisor, spoke up. "It is my opinion that we have to accept the Lone Pine report as true. It may seem, on the surface, somewhat far-fetched, but when you consider it, it's not. If the visitors can make cars, it seems entirely reasonable they also can make houses. A more difficult job, of course, but only in degree. I, personally, would say they are equal to it."

"But houses!" said Whiteside. "Cars are one thing; houses are another. They can distribute the cars, but how will they go about distributing houses? By setting up new housing tracts, perhaps, taking over valuable farm lands or industrial sites for the tracts? Or knocking down rows of substandard housing and placing the new houses in their stead?"

"It doesn't make a hell of a lot of difference how they go about it," Hammond said. "No matter what they do, whether they do anything or not, the threat is there. So far as this country is concerned, the housing industry is wiped out."

"I had said," the President told them, "that we could weather the elimination of the automotive industry. I don't know about this other. The thing about it is that it plants an overriding fear, a cancer in the economic picture. If the auto industry and the housing industry are gone, is there anything that's safe?"

"How is the car situation going out on the Mississippi?" Hammond asked.

"It's ugly," Porter told him. "We have Goose Island cordoned off, but the crowds are building. Sooner or later, there is going to be an incident of some sort. There are a dozen or more people dead that we know of. A boat swamped and went down when car-seekers overloaded it. There'll be more of it, I'm sure. You can't keep people from getting their hands on free cars. The greedy bastards are going to make a lot of trouble."

"That is a single situation," White pointed out. "We can't waste time on it. What we have to do is work out a policy. When the news breaks, we have to have at least the beginning of a policy. We have to give the nation and the world some indication of what we intend to do about it."

"It's going to go down hard," said the President. "Whatever we do, it will be hard to take. From our first beginnings, we have been a proud people. Standing on our own feet. It's not in us to cave in."

"Some damn fool," said Whiteside, "started a rumor on the Hill that there had been a weapons test and we're onto something. It won't take

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long for Ivan to pick that up. Get him upset enough and one touch of a button..."

"That rumor," said the President, "wherever it might have come from has served to keep the Congress solidly behind us. If it hadn't been for the rumor, no one knows what they might have done."

"That is all behind us," urged White. "We should forget it now. What's done can't be helped. We have to live with it. As I've told you from the start, we can't work it out alone. If we act in a reasonable manner, we will have the rest of the world behind us. We've not gone so far that we've lost good will."

"Even Russia?" asked the President.

"I don't know what they'll do to help. Probably more than we would expect. But if we react reasonably, they'll keep their fingers off the buttons Henry talks about."

"And what else? Just what do you have in mind? What do you see?"

"I am convinced we have to agree, in principle, that the visitors constitute an international problem, that we must consult with other states considering the situation that has been created here. I think that most of the major states realize that no one nation, us or anyone else, could contain such a situation, that eventually, it will spill over national boundaries, any national boundaries, and that it will become a world problem. I think the time has come to invite help and cooperation from the rest of the world, from anyone who might be willing to help and cooperate."

"Marcus, you have talked with some of these people?"

"Informally, yes. Unofficially. Mostly, they have done the talking and I have done the listening. Those I have talked with are convinced that whatever happens to us now will happen to them later unless the problem, or problems, can be solved."

"What sort of cooperation can you detect? We have to know. If we go international, we have to know where we stand, what we can expect."

"France and Britain are ready to come in—in any way they can be of assistance. Do what they can to bolster the dollar, do whatever they can. Japan has the same willingness. The Scandinavians are waiting only for a word from us. The West Germans stand ready, if necessary, with monetary aid."

"You mean foreign aid? For us!"

"That's exactly what I mean," said White. "Why flinch away from it? We've carried half the world on our back for years. We rebuilt Western Europe after World War II. It would be no more than turn and turn about. It's their ass as well as ours and they know it. The rest of the world can't afford to let us collapse. Even the OPEC people would rally around."

The President looked around the table with a stricken face. "Oh, my God!" he said.

"It's not only the matter of keeping us from going under," said the secretary of state. "It's a matter of

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working out a new system—a new political pattern, a new financial concept, perhaps a rehauling of the entire economic structure. Not for the United States alone, but for the world. The visitors not only have come close to ruining us, but they have changed the situation for the entire world and we have to find a way to live with it. Nothing will ever be the same again. I think the first job, and perhaps the hardest, will be to honestly analyze what has happened. We have to know that before we can assess its impact."

"You're very eloquent on the subject, Marcus," said Hammond. "Do the other nations, the men you have talked with so informally and so unofficially, recognize all the factors that you have outlined for us?"

"I would say they do," said State. "At least, their thinking runs in that direction."

"But the tests," cried Whiteside. "We are onto something. Do we have to give up everything? Can't we, somehow, hold back on what we found?"

The President said, quietly, "I don't think we can, Henry. You have heard what the man said—a new kind of world and a new way to live in it. It comes hard for old battle-scarred dogs such as you and I, but I can glimpse some of the logic in it. I suppose that some of us, maybe the most of us, have been thinking something like this all along, but couldn't bring ourselves to say so."

"How the hell we'll ever work it out," said Hammond, "I don't know. I just don't know."

"Not us alone," said State. "The world. It's not up to us alone; it's up to all the others. If the world doesn't pull together on this one, all of us are sunk."

57. MINNEAPOLIS

Gold was reading copy on the Norton story. He lifted his head and looked across the desk at Garrison.

"This last paragraph," he said.

"What about the last paragraph?"

"Where he tells about seeing shadows in the kitchen, as if there were people in the kitchen. And he thinks, 'My God, are they making people, too?'"

"There's nothing wrong with it. It's a honey of a line. It makes cold shivers up your spine."

"Did you tell Lathrop about this? Mention it particularly to him?"

"No, I guess I didn't. I forgot. There were a lot of other..."

"And Porter?"

"No, I didn't tell Porter. It would have scared the pants off him."

"It could have been Norton's imagination. He didn't see any people. All he saw, or thought he saw, were shadows. Maybe he imagined shadows."

"Let me see it," said Garrison, holding out his hand. Gold handed him the sheet.

Garrison read the paragraph carefully, read it through again. Then he picked up a heavy, black editorial pencil and methodically crossed out the paragraph.■

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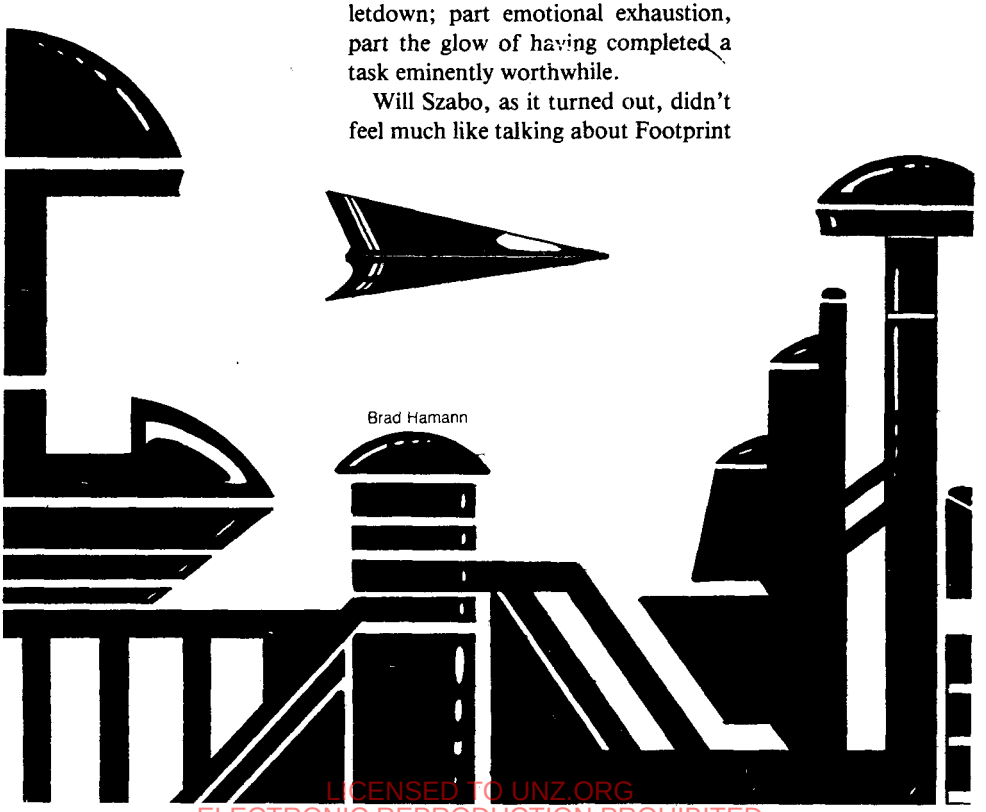
long shot

It's really hard to calculate odds—especially when the parameters may change.

Dean McLaughlin

On his way back from the Cape, Mike Franz stopped off in Washington to talk with Will Szabo at NSF about the Project Footprint grant. It was still lost in darkest bureaucracy, and he entertained vague hopes of getting it back on the line, but just then his heart wasn't in it. Always, at the end of a business like Pathfinder there was a feeling of letdown; part emotional exhaustion, part the glow of having completed a task eminently worthwhile.

Will Szabo, as it turned out, didn't feel much like talking about Footprint



Brad Hamann

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either. "They're still batting it around up in Policy," he said. "I think the anti's don't have the votes to kill it, and know they don't, so they're talking and talking and hoping it'll die of old age. When they run out of words, it'll come down." Then he said, "Did you stay for the launch?"

"After what I went through?" Mike Franz grinned. "I watched her go up and I hung around till they had the tracking report." Some of his energy came back. "She's go. Saturn, Uranus, and then . . . all the way."

"Was it really that tough?" Will asked.

Mike shrugged. "Technically, it was like cutting cheese. But hectic?" He slouched lower in his chair. "A job like this—it's not like flying an experiment. That's primary mission. You've got the time to organize what you want to do and get your instruments built and make sure they'll do what you want done. This monument package, now, you know how they happen. The launch was already on the schedule, and all of a sudden somebody says, 'Hey fellas, this one's going all the way. A million years from now, somebody might find it. Let's add a monument package.' Well, they could of just done a copy of what Carl put on Voyager, but that wouldn't of got them much notice in the press. It's already been done. And it's the press notice they're really thinking about. Budget time's never so far off they don't think of things like that. So, naturally, they go to Carl and ask for a new improved version, only this time he's busy, or not interested, or..."

"He thought it needed a fresh viewpoint, was what I heard," Will said. "He suggested you."

"Someday I'll thank him," Mike said, but his tone said it would be a while. "So there it was on my desk. It's four and a half months to launch, and if I won't do it there's not a chance of getting it aboard. What could I say?"

"You could have suggested somebody else," Will said.

"Such as? I'm not complaining; understand that. It's been exciting and fun and . . . and it's sort of, well, almost scary to suddenly have it in your hands to put together something that will say who we are, and what we are, and where we are, and when, all in twenty-five kilograms or less. It's well, a challenge. And—interesting. I guess the odd thing is that they think it's something only an astronomer can do."

"Would anybody else take it seriously? In the press release I saw—NASA sent us a copy—if it's anything to go by, I'd say you did a wonderful job. Just the list of things you put in, all by itself, it really grabs the imagination."

Mike shrugged. Talking about it woke deep feelings, which made him uncomfortable. "Would you believe I never noticed that until I saw it in the release? I was too close, a lot of the time, to think about how it added up." Suddenly, he had to chuckle. "Have

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you ever thought how it would go, when you call up the encyclopedia people, and you have to explain to the switchboard girl you want to make a micro-etch copy of the whole encyclopedia and send it off in the general direction of the Pleiades, and who do you talk to about the copyright clearance?"

"You had to get copyright clearances?"

"Next time I'll know what not to put in. No dead Englishmen and no living poets." Mike held up a hand as if his other hand was on a Bible. "One of the poets wanted two thousand dollars. Six lines, if you count the asterisk. He didn't get it."

"A whole encyclopedia," Will murmured. "And you picked the best. The very best."

"When you care enough—" Mike passed it off with a wave of the hand. "Actually, I felt better about the dictionary. I had to fight for that one. Naming no names, somebody at NASA thought I should have made it an American dictionary. Didn't slow him down at all, that we don't have one that's thirteen volumes, not counting the supplements."

"Well, you got it."

"I mentioned Tolkein worked on it. Suddenly it was as if the heavens had opened and a light shone down on me. And the art. That's another thing I feel good about. Carl never had the time or the payload allowance to get much art in, but he chalked out so much of the groundwork I could take the time. Lascaux, Egypt, China, the Venus de Milo, Hokusai, Norman Rockwell..."

"Picasso?"

"Couldn't leave him out. Or Michelangelo. And Leonardo—a thing like this, I had to include Leonardo."

"Also Walt Disney," Will reminded him with just a touch of scorn.

"Certainly. He's as much a part of our world as Mount Fuji." Mike smiled. "But I do wonder what they'll make of the mouse out there in the Pleiades. Same goes for Superman. Amazing, what you can pack into twenty-five kilograms."

"Do you think anyone will ever find it?"

Mike turned sober. Almost cold. "That's the hard part. All that work, and a lot of it *was* work—especially the crazy scramble we had at the end when time was running out—and the chance it'll ever be found is several billion to one. At least."

"But there *is* a chance," Will insisted. "Or you wouldn't have done it."

"A tiny chance," Mike said. "So tiny it's not worth talking about, except...well, it's going to be out there a long time—maybe all the time until the last star in the galaxy burns out—and if somebody does find it, if we hadn't put our capsule aboard, they'd never know who made it. You could call it pride, I suppose. I guess you wouldn't be wrong. But, well, better to have done it uselessly than to not have done it if we should have."

"Admit it, though," Will said. "You're hoping it'll be found."

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"Wouldn't you?" Mike smiled. "Just between us, somehow we flubbed the count of frames on the micro-etched component, and it left us with a blank one at the end. So I signed my name and I gave them my address and my phone number. Silly, I suppose. I'll never know; the minimum possible time is thousands of years. But, well, just in case." Thinking about it made him feel sheepish. "A painter signs his work," he said defensively. "And a poet puts his name on his. Well, this one's mine."

Will chuckled. "Yes, But will it sell in the Pleiades?"

He could have stayed in Washington overnight, but he was anxious to get home. He'd been on the run for a week, and then the launch had been delayed a day by last minute instrument troubles in the launch vehicle. Things would be starting to pile up in the office. One of the problems in Big Science, a jaundiced colleague had once said, was that a man didn't have time to think, to which another colleague—even more sarcastic—had replied yes, but the glory of it was that you didn't have to. The airport shuttle dropped him less than a mile from home. A cab took him the rest of the way to his door.

Dusk was thickening as he mounted the familiar porch. The house was dark; Clara would have left that morning for a few days at Fermilab. He'd missed her, thanks to that unspeakable thermocouple. Well, he'd phone her after a while. He paused to collect the evening paper, which had made it almost to the top step—the boy's throwing arm must be getting better—and unlocked the door.

Standing in the hall with his attache case leaning against his shin, he broke the newspaper's fold. Something dropped out. Advertising garbage, he thought sourly as he checked the headlines. Not much had happened; the Secretary of Commerce had made a slip of the tongue, a Teamster official had disappeared on the eve of a scheduled grand jury appearance, and a cancer quack who "had only been trying to help people" had been found guilty of violating some obscure section of the FDA's regulations. He wedged the paper under his arm and—mindful of Clara's insistence on a neatly kept household—bent to retrieve the piece that had fallen. Straightening up, he would have cast it in the trash catcher conveniently located next to the mail drop, but the one glance he gave it was enough to make him pause.

Though card thin, it was not made of paper, and even in the muted light there was something odd about the border around its edge. He snapped on the light.

Larger than a postcard, smaller than a typewriter page, the card bore a strip along its edges of iridescent rainbow hues that shifted spectrumlike with every change in how the light struck it. Diffraction grating, of course, but an interesting effect.

By then the message had him. He'd always been one of those persons who could look at cold print and know

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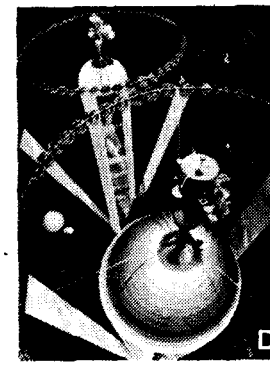

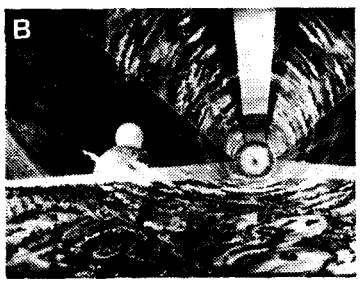

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what it said without conscious effort. It had been a shock when he discovered there were people who couldn't. The typeface was strange, like no font he had ever seen. The message itself, for all its clarity of words, was even more strange.

TO PROFESSOR MICHAEL FRANZ, GREETINGS:

THIS INTERTEMPORAL MESSAGE-BEARER WILL DISSIPATE UPON COMPLETION OF ITS MISSION. ONLY INFORMATION CAN PASS ACROSS THE YAWN OF TIME. YOUR ARTIFACT AND INFORMATION WERE RETRIEVED BY US IN GOOD CONDITION CONSIDERING ITS DURATION IN EMPTINESS 4,738,641.8662 OF YOUR YEARS AFTER LAUNCH. WE ARE GRATEFUL. OUR SCHOLARS ARE NOT ABLE, THOUGH, FULLY TO AGREE ON UNDERSTANDING OF ONE DATUM. SEGMENT 70 OF THE VISUAL MODE COMPONENT REVEALS A MEMBER OF YOUR SPECIES WHO STANDS ON A NARROW STONE SPIRE OF APPARENT NATURAL ORIGIN, WHICH APPARENTLY WITH GREAT DIFFICULTY AND EFFORT HE HAS CLIMBED. SUCH BEHAVIOR IS NOT RATIONAL AND WOULD SEEM TO CONTRADICT MUCH ELSE YOU WOULD HAVE US KNOW ABOUT YOURSELVES, YET IT WOULD SEEM YOU JUDGED THIS ITEM OF SUCH SIGNIFICANCE THAT IT SHOULD BE INCLUDED TO THE OMISSION OF SOME OTHER ITEM BEYOND OUR POWER TO SPECULATE. AT GREAT COST WE INQUIRE OF YOU WHO CAN RESOLVE OUR CONFUSION. WHEN THE RECEPTOR GLEAMS, SPEAK, AND WE SHALL HAVE ENLIGHTENMENT.

Caution made Mike look around, half expecting the joker's laugh. No one. Still, it had to be a hoax. It could be nothing else. Chuckling, he was about to drop it in the trash when the red spark blossomed in the exact center of the card, bright as the heart of a fire.

How, he wondered, could a joker have done that?

Then he wondered, how beyond all possibility could he be absolutely sure it was a joke?

Still holding the card, he strode several steps. The likelihood of it being anything but a joke was overwhelmingly small. Nevertheless, it was not zero.

About to sit down in an armchair, he paused and remained standing. Uncomfortably aware he was almost certainly making a fool of himself, yet equally sure there was a tiny chance he was not, he began to speak.

"If it must be explained," he said, beginning slowly, "I'm not sure an explanation is possible. To begin with, compared with some things men have done, it was not particularly difficult."

He spoke for perhaps five minutes. Possibly it was longer. It was not possible to give an explanation; all he could do was set forth at least some of the parameters within which that inexplicable urge was contained. He wondered if his words would make sense to anyone but himself, and knew with a dark solemnity that probably they would not, but in spite of that he had to try. At last, talked out and aware he'd begun to repeat himself, he

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then sighed, and ended it.

For a moment nothing happened; had he thought anything would? The jesters at last bursting upon him? But there was nothing. Then . . .

May your vision ever be clear. We thank you.

A voice? He wasn't sure if he heard, or only thought he heard. Most likely he imagined it; that was the most sensible explanation.

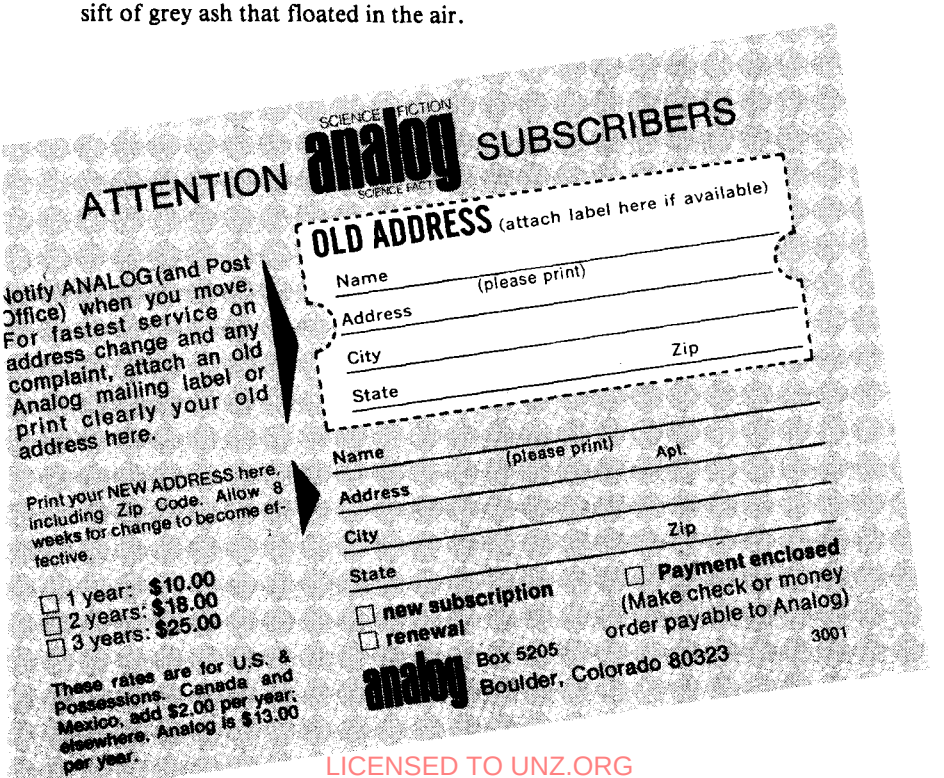
But then, more faintly, it came again.

Pithaffka, the wager is mine!

And with a soft flicker of light, soundlessly, the card dissolved to a million motelike sparks that swirled before him like a galaxy of stars, winked out one by one, and became a sift of grey ash that floated in the air.

For a long time he stood, watching the ash cloud disperse before him, almost beyond wonder, almost beyond doubt. When, finally, he moved it was to pick up the phone. His fingers tapped out the long distance number as if they remembered it themselves, so often had they tapped that sequence. He listened to the music of the dialing tones, the shift of whispers in the open lines, and finally the ringing at the far off end. Carl answered on the fifth ring.

"Carl? Mike Franz here," he said. He tried to keep his voice matter-of-fact, but he knew it was a bad job. "Carl . . . uh, Carl, I know you're not going to believe this, but . . ."■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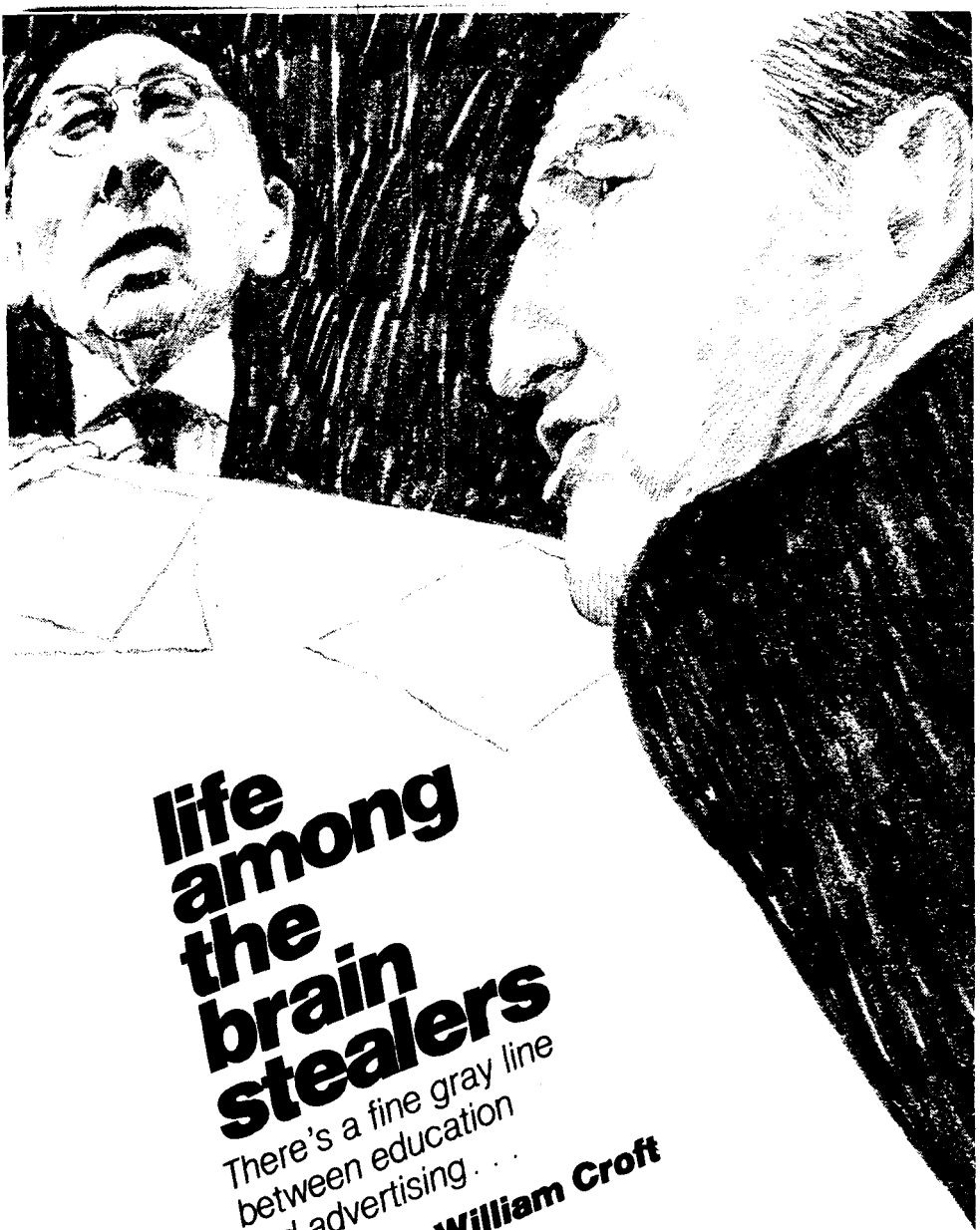

life among the brain stealers

There's a fine gray line between education and advertising . . .

Frederick William Croft

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"You," announced Aurelius, "are in luck. I've got a job that's tailor-made for you."

I didn't feel lucky. Since seeing the morning commodity reports, I felt about as fortunate as the folks who bought Penn Central stock in 1970 figuring it *couldn't* go bankrupt. Soybeans were down two points—grim news for those of us with a quarter-million dollars in soybean futures. Maybe I was being an economic Chicken Little and the sky wasn't falling, but things looked uncomfortably close to a financial ceiling zero.

Which didn't mean I was thrilled about going to work.

"What *is* this tailor-made article?"

"A little company called Planmarketing. I'd like you to handle a few things for me. Nothing tough—just the usual."

Just the usual.

On my last job for him, "the usual" had involved espionage, gunfire, mad scientists, deceit, fear, greed, humiliation, aircraft hijacking, auto chases, exploding vegetables and a plane crash in the Mojave desert. During all of this, as always, Aurelius remained the mysterious voice on the phone—safely out of range of subpoenas or other deadly weapons if anything went wrong.

However, he did pay well.

"An interesting little property." His voice turned elaborately casual. "I'm expecting a one thousand percent return on this within the first year."

One thousand percent. He knew how that would sound to any analyst who'd been on the Street longer than it takes the traffic lights to change. Tell a miner he's just hit the Motherlode. Tell a politician he's just been elected President. Tell Parsifal he's just found the Grail at a garage sale. Tell a securities analyst he can make a thousand percent annual return on investment. All equal.

Still, I was cautious. My voice colored with the ennui of a man who can afford to be above all these petty financial matters, I asked, "What's supposed to hold my interest?"

"Five percent. Are you in?"

"Is the Pope Catholic? *What* am I in?"

"In the chips if you handle this right. Your share should be worth ten million within eighteen months." The last time I'd heard a voice that confident, it had bought Teledyne before the big rally. "But it's worth it to me. I need someone to keep an eye on this—haven't got the time myself."

I nodded into the phone. "I've got twenty-twenty vision when it's partly my money."

"It'll take some time." His voice took on an apologetic tone normally heard from brokers who told you to buy cocoa at fifty-four. "They're bright people, but not very experienced in our field. You may have to give them a helping hand."

Tactfully, he didn't mention said hand's viselike grip on their bankbooks. He didn't need to.

He knew he could count on me.

Planmarketing, Incorporated was a

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shiny little company in a shiny little building in West Los Angeles. Their shiny little receptionist wasted no time in passing me through to Lazenby and Roehm, who were neither shiny nor little and therefore looked out of place in the business they'd founded.

Since his *Time* cover, Doctor Derek Lazenby has moved to first place in the Albert Schweitzer selfless-man-of-science sweepstakes. The Teller Humanist Award, The Vienna Prize, Citations of Merit from assorted foundations, decorations from six governments and a special note of thanks from the Pope.

He looked more humble than anybody who was honest.

Ernst Roehm had equally impressive credentials, but the thing that impressed me about both of them was their eyes: slightly narrowed, hard, calculating, alive with that flashing passion sparked only by avarice or true love. I knew it. The same look I saw every morning in the mirror.

These jokers might fool *Time* magazine, but I recognized a sell-out when I saw one.

Ernst Roehm shuffled with practiced humility. "You understand, we're not very skilled with money..." His white-haired head bobbed with shy uncertainty.

Lazenby nodded. "We do have some private funding sources," he admitted. Under his selflessness he was large and florid, looking somewhat like a used car salesman in church as he folded his hands piously. "But it isn't a matter of profits. Many firms feel it's a public service, helping us in our poor effort to aid humanity."

"You can cut the crap."

Lazenby gave a relieved sigh. "Thank God! It usually takes hours to get through the 'servants of man' shit. Okay! Let's get down to the real throat-cutting."

Tells you a lot about awards.

I raised an eyebrow. "You—ah—don't sound quite as philanthropic as your *Time* interview."

"Screw philanthropy! I've busted ass for twenty-five years—what's it get me? A bad portrait on a cheesy magazine cover." He shook his head sadly. "Didn't even show my good side. Meanwhile my car needs a new transmission, my wife's run off with the accountant and I missed out on Directorship of the Atherton Foundation because they wanted someone 'less altruistic.'" His smile was cold as those of speakers at Nuremburg rallies. "Let's get to it."

I pulled up a chair. It squeaked; his office furnishings were left over from the philanthropic past. "Well, what do you want?"

Lazenby shrugged. "The usual."

Roehm bobbed his head. "Dope. Sex. Cheap thrills."

The usual.

I leaned back in the chair; a spring died with a hollow metallic sigh. "What're you selling?"

They told me.

The product came from research on worms. No, not worm farms. I'd already used that scam once. These were planarian worms, ugly little items

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looking something like a cross-eyed traffic arrow.

Researchers had been using these things for years, studying the learning process on its most primitive level. Running them through mazes and things. They used electric shocks when the worms made mistakes to teach them the right path through the maze.

Then they found a funny thing. They took the worms that had been through the maze, ground them up, and fed them to another batch of worms. Apparently planarians aren't warm and cuddly enough for this to raise an outcry from the SPCA, or the SPCW, or whoever watches out for such things.

Anyway, that's when the funny thing happened. The new worms knew how to go through the maze, even though they'd never done it before.

"Knowledge was transmitted chemically," Roehm assured me. His eyes gleamed brightly. "Once we learned how to do it, the grade-school dreams of 'smart pills' were reality."

I frowned. "Isn't it gonna be a little rough on the teachers—grinding them up for food supplements?"

Lazenby took over smoothly. "We only need a few neurons. The donor is unharmed. We take the cells and culture them to get all the supplies we need."

I nodded. "The Silberman process, no doubt."

He looked impressed. "You have a background in science?"

I shrugged. "I have a subscription to the *National Enquirer.*"

Roehm nodded. "At any rate, we have working versions of the pills."

"Well, then we can get started on the educational market..."

Lazenby gave me a smile like a cobra. "Not if I have anything to say about it." He pulled out a cigar and lit it. The cigar was also from the philanthropic era. "We've got a more profitable plan."

Dramatic pause. Lazenby's eyes focused on the Infinite, a secular Augustine envisioning the gold-paved streets of Heaven. One hand was raised before him. Roehm stood with bowed head behind his chair.

"I have a dream," breathed Lazenby. "Our clients will be the largest consumer product companies in the world. With the largest budgets.

"They'll give us a product. Ideally it'll be a food or drink, though this could work on anything. Then we run a survey to find people who really *like* the product. We take their neurons and duplicate them. Then we take the duplicated neurons and mix them in with the product."

Roehm nodded eagerly. "Free samples are given out. And each sample *teaches the person to prefer the product.*" He smiled widely. "Instant demand."

I saw the larger implications, of course. It was sleazy. Disgusting. Irresponsible.

I loved it.

The meeting with SPLASH! cola was a breeze. Assorted greying ex-

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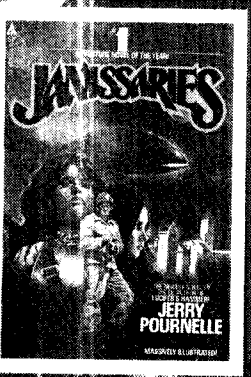

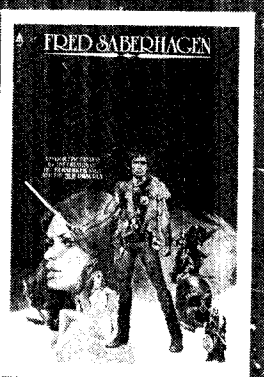

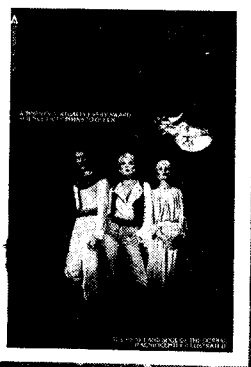

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ecutive types listening and nodding enthusiastically. Almost anything would've made them nod enthusiastically—these were men ready to grasp at straws. The hint of a successful marketing program had them lunging like piranha.

Their lawyer made a valiant last-ditch attempt to foul things up. Realizing that a lawyer's purpose is to kill deals and that actually allowing an agreement to be made in his presence would result in embarrassment, ridicule from his fellow professionals and possible disbarment, he fought courageously, as men will fight for ideals they hold dear.

"How can we do this legally? Wouldn't we be *addicting* these people? The FDA..."

"Will have nothing to do with it, I'm sure." Lazenby looked properly humble. "This isn't addiction; there's no physiological dependence. It's *education*."

I kept any doubts about their difference to myself.

"Of course, of course." The Marketing Director spoke quickly, eager for anything with a chance of bettering his performance (a loss of forty percent in the last year). His eyes were glazed with a panic normally seen on tourists in the Lesser Sunda Islands watching their tour boat steam unexpectedly away. "And we do have to think of the shareholders—think of the stock value if this works."

"And our stock options," murmured the Treasurer.

"What about...?" Their lawyer's voice died away with a gurgle as he was muffled by a member of the board of directors.

The meeting moved quickly after that.

Leonard J. Sprunk was thirty-six years old. He was wearing a ban-lon shirt, white shoes, and a suit shiny enough to blend in nicely with the shiny little reception room at Plan-marketing.

I nodded to Lazenby. "I see you found him."

Leonard himself answered. "Yes, *sir*!" He had a very *enthusiastic* voice. Sounded as though he read a lot of Norman Vincent Peale.

"He loves SPLASH!" Roehm whispered.

Leonard heard him. "I sure *do*," he said. "And I think this whole thing is *wonderful*—being flown out to *Hollywood* to help my *favorite* product. And making *one hundred dollars*! It's great." He frowned momentarily. "I just hope that I get back home in time for this week's *Charlie's Angels*. Wouldn't want to miss it—it's such a *good* show."

Fearing overdose, I stepped into Lazenby's office. Lazenby himself followed.

"Had to go through eight hundred and forty-one people to find him." Lazenby sighed. "I was beginning to think that nobody in his right mind would drink SPLASH! cola."

"Still a questionable assumption."

He shrugged. "He'll do for our purposes. We don't need a great mind—

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we're only educating the consumer."

I sat down at his desk. It was new, large, and very expensive. The company had grown since Aurelius stepped in—apparently the planarian process required new office furnishings, Lear jets, and 450 SL Mercedes, as company cars. "Aurelius is pleased."

Lazenby nodded. "He should be. This venture should make us all very rich men. Very rich indeed."

I nodded. Like Abraham, Martin, John and Lazenby before me, I had a vision beyond that of the sugarplums dancing through my head singing: *we're in the money, we're in the money*... It was a vision of the future of America. America, where people would wear lots of shiny suits. Where they'd eat Big Macs by the kiloton and read bestsellers and watch *Eight is Enough* and like it. And drink SPLASH! cola by the case. We could do it all, putting properly encoded neurons in the hamburger, in the paint of the car (to be absorbed through the fingertips), in the ban-lon shirt, in the pages of *TV Guide*....

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in times to come

Next month, January 1980, marks the Fiftieth Anniversary of Analog. The name has changed a few times, but the magazine has been going and growing since the beginning of 1930. We celebrate the occasion—the beginning of our next fifty years—with a special issue that begins a whole year of specials.

During the first fifty, as you well know, a great many of the finest writers in this field have found a home in Astounding/Analog. Many who have been closely associated with the magazine in the past have been recently devoting most of their time to other things, such as books—but quite a few of them are coming back to help us celebrate the anniversary. I'm not talking about reprints—this magazine has always been too forward-looking to dwell on repeating the past—but new stories and articles from your old favorites.

In January we begin One-Wing, *a two-part serial by George R.R. Martin and Lisa Tuttle, chronicling further happenings on the intriguing world they introduced in their earlier Analog story, "The Storms of Windhaven," with a spectacular cover by Paul Lehr. George Martin is an Analog discovery who has gone from anonymity to great prominence in the last very few years; in the same issue we offer "The Last Answer," a short story from Isaac Asimov, one of the most prominent names in these pages during John Campbell's so-called "Golden Age," who has since gone on to vast numbers of other things (including a guiding role with one of our leading Friendly Competitors). Plus a new story by former editor Ben Bova, Dr. John Gribbin's article on "Carbon Dioxide and Climate—The Burning Question," and a special "State of the Art" wherein William Sims Bainbridge recalls some interesting aspects of our history as seen through 38 years of the monthly Analytical Laboratory.*

And beyond that? We already have in inventory pieces by Raymond Z. Gallun, Mack Reynolds, Clifford D. Simak, Jack Williamson, George O. Smith, Laurence M. Janifer, Dean Ing, Spider Robinson....

And promises from several more—so we should have at least one Anniversary Special in every issue through 1980.

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I made a mental note to check land prices in Switzerland.

Things were going well. We set up a test market in Black Lung, Pennsylvania, a coal-mining town of 15,000. Figuring it was a good test, if the neurons could make it through the suffering and disease to those brains, they could get through to anybody.

We also administered neurons to the entire staff of SPLASH! cola. An employee relations move. They figured employee relations would be easier if everyone believed in the product they were producing.

After that, I took a vacation. Did some traveling. Found myself a nice little palace on Lake Como to buy with my Planmarketing earnings.

When I got back, the phone was ringing. It was Nicholson, the Marketing Director with SPLASH! cola.

"It'd be just *great* if you'd get right over to our offices."

Something was wrong. He sounded like a very irritable man who'd read a lot of Norman Vincent Peale.

I told him I'd be right there.

"It's so *good* to hear that," he replied.

Lazenby and Roehm were already there when I arrived, sitting at one end of the conference room. They didn't look happy.

The SPLASH! executives sat on the other side of the conference room. They were all wearing white shoes, shiny suits and snarls. Already I wished I'd spent that extra week in Zurich.

"We're so *happy* to see you," said the Chairman of the Board. He didn't look happy. "We're *sure* you can tell us something *wonderful* to do that'll get us out of this crisis."

I sat down carefully. "Perhaps you can tell me what happened."

Nicholson stood. There was a Peter Benchley novel in his coat pocket. "It's your drug. It's *wonderful* that it makes you like SPLASH!—but it makes you like other things, too."

"I find myself eagerly awaiting *Charlie's Angels* reruns," said the Treasurer through clenched teeth. "It's such a *good* show."

A plant manager nodded sadly. "Do you know how many Bonusburgers I've eaten in the last week?" He sobbed into his tie with a hula girl painted on it.

I turned to Lazenby. "What's going on here?"

He looked embarrassed. "There's a leakage problem. We only took the cells for SPLASH! But something's wrong. It's not selective; all of Sprunk's other tastes are coming through."

Roehm stood by his side, looking humble as always. He had reason.

"Sears furniture..." sighed one of the Directors. The Secretary nodded. "I never want to see a CB radio again...."

It was staggering. Thousands of Leonard J. Sprunks, legions of them. I rose even as my lunch did likewise and turned to Lazenby. "What can we do—besides buying Big Mac stock?"

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Lazenby shrugged. "I've got my best people working on it." He gestured apologetically at the SPLASH! executives. "And without reinforcement, it ought to start wearing off in a week or so."

"A week!" The executives issued a collective groan.

"Hostess Twinkies...." muttered the President, turning a page in this week's edition of *Midnight.*

"And SPLASH!" groaned the Treasurer. "It's a shame—when this wears off we won't be able to *look* at the stuff. How can we run a business with a product we can't look at?"

I sprinted to the receptionist's phone and called in a short sell order on SPLASH! stock.

Things were looking grim. Plan-marketing was faced with disaster; my ten million dollars in stock was rapidly joining the Lost Dutchman Mine, the Seven Cities of Cibola, United States currency and other mythical stores of wealth. Lake Como had never seemed more distant.

"Lazenby," I wailed. "We've gotta straighten this out! My future indolence lies in your hands!"

He shrugged. "We're doing the best we can."

I groaned. "When will we know if it's working?"

His eyes looked solemnly Heavenward. "Only Time will tell."

They sold that nice little palace on Lake Como that I was looking at. To some fat Arab who'd never seen a bottle of SPLASH! and wouldn't know a planarian from a Big Mac. Lucky him.

My chance for big money is, alas, gone with go-go funds, the gold pool agreement, and The Wind.

It's been rough for everyone. There were major resignations at SPLASH!, Inc., with the stock price making an Olympic-caliber swan dive toward the realm of imaginary numbers before trading was suspended. The SEC started an investigation which was taken over by the Pentagon. Everything was immediately hushed up "in the national interest" and Roehm, Lazenby, and the planarian marketing process all moved to Washington. The prospects stagger the imagination.

Without staff or product, Plan-marketing did predictably poorly. The last time I was masochistic enough to check, company market value was slightly below shares in manufacturers of gladiatorial armor.

It would've been depressing if I hadn't done so well shortselling SPLASH!

Aurelius called the other day. He wanted me to work with him on some stock that's got an eighteen hundred percent R.O.I. in three years. I made several colorful suggestions where he could stick said stock certificates for safekeeping.

I don't want to go back to work. Don't need the money—I can coast for another six months, easy. And I've heard some hot rumors about the skin diving in Cosumel this time of year.

Of course, you can't help thinking. Eighteen hundred percent.... ■

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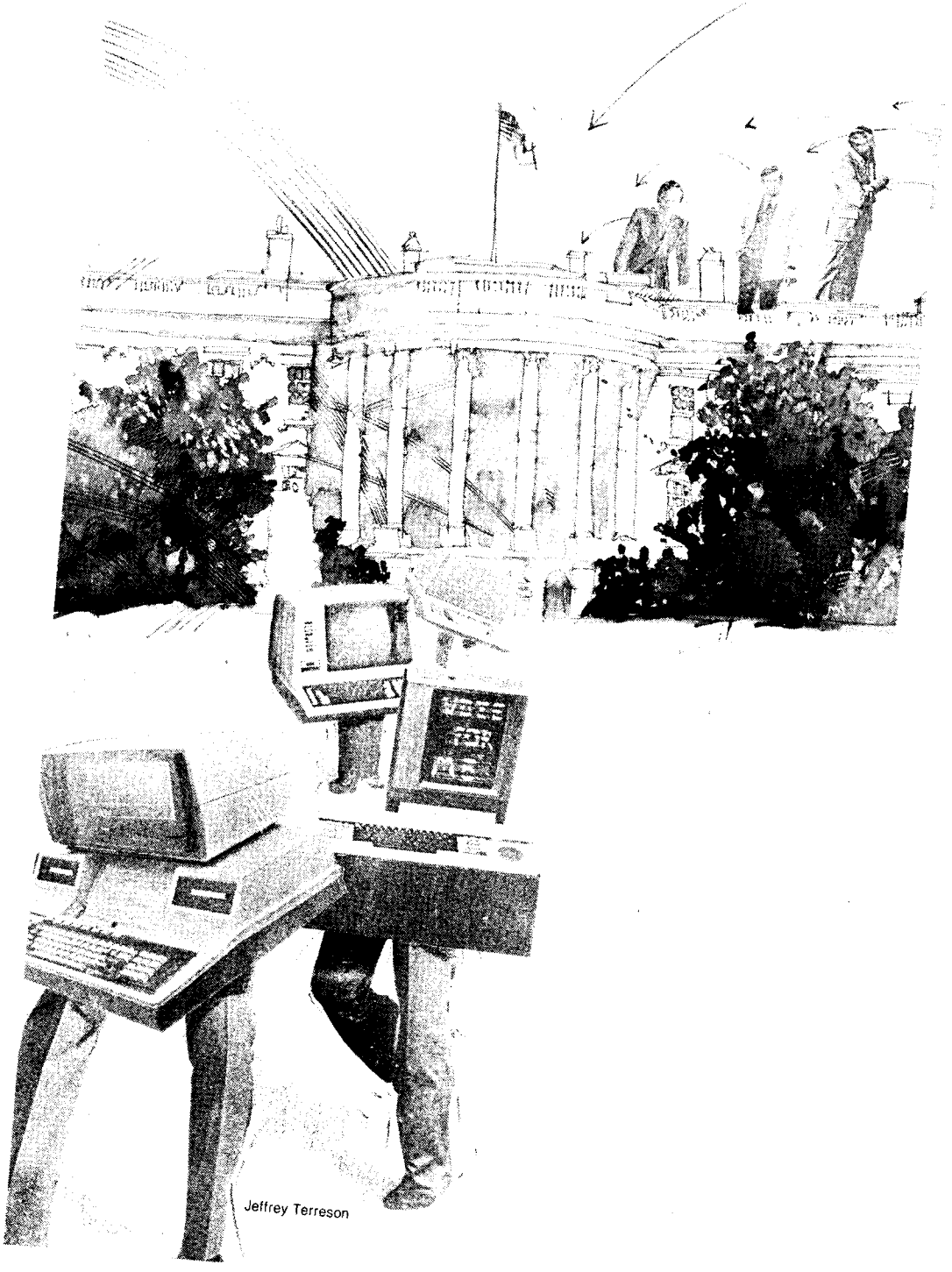

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qualification test

Paul J. Nahin

"Damn it, *to hell*! Get over here, MacDonald. I can't get this cruddy program to run. Give me a hand, will you!" Melvin Schluck, a large, loutish, somewhat ugly man in his late fifties, sat before the video screen of a PerComp personal home computer. He was desperately trying to get it to run a BASIC language program to add the first two hundred positive integers. All that was happening was the display of the message, 'ERROR 53 IN LINE 30.' His special aid, Professor R.Q. MacDonald, on leave from the Computer Science Department of the State University, hurried over. He was dragging down a two-hundred-fifty-dollar a day consulting fee, and was eager to please. "Yes sir, Governor. Let me list your program and I'll take a look at it."

MacDonald quickly punched in the system command to scroll the six line program onto the PerComp's video terminal display. The screen filled rapidly with bright white alphanumerics as the machine's memory unveiled its contents. He groaned to himself (the idiot *still* didn't know how to write a FOR-NEXT loop!), but with a supreme effort, he kept his thoughts silent. MacDonald paused

In any technological revolution, some get left behind.

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for a few moments—he wanted the Governor to think the error was subtle enough to stump the expert, too. Then, finally, he patiently explained the problem, and after listening to the fool cackle with pleasure when the program at last ran, MacDonald excused himself to go to the bathroom. He left with what he hoped wasn't too obvious a relief.

When he got to the john, MacDonald slowly loosened his tie, and then splashed cold water on his face. The only reason he was involved with the incompetent old bastard was the money. Ironically, he needed it because his salary at State U., just barely at the subsistence level, was low precisely because of the Governor's ultraconservative fiscal policies. With no broad based taxes, the major portion of state revenue came from oppressive gambling and liquor taxes that barely generated enough cash to keep highway potholes filled. "Christ," he murmured to himself, "talk about being between a rock and a hard place. I don't make enough money to get smashed so I can forget I can't afford to get smashed!"

"What's the matter, Ron, can't you take working for old Mel? You know, you haven't got a chance, *not a chance*, of teaching that old dog even a single new trick!"

MacDonald looked wearily at his good-natured taunter, who was emerging from a stall while cinching up his belt. It was Jack Kraus, a professor in the electrical engineering department at the University. He and Jack were friends, but Jack had offered his training services to Reggie Smyth first. So MacDonald had signed on with the Governor (but only for the money, as he repeatedly told himself). "I tell you, Jack, I don't see how a human being can be so goddamned, bloody stupid and still able to talk and walk at the same time. The man is a mental aberration, with spaghetti for brain convolutions. How in hell did he get elected governor *five* times?!"

Kraus shrugged his shoulders and turned away from the washbasin to dry his hands with a paper towel. "Ron, the fellow may be illogical, but he's a better con man than either you or I will *ever* know. Being intelligent, under the old rules, didn't count—getting votes was the *only* name of the game. Hey, look, cheer up, will you! You're not alone, you know. My man is so empty-headed that you could put a bullet through one ear and out the other and his IQ wouldn't perceptibly change."

MacDonald couldn't help but grin. "Reggie is really that bad? He seems like a decent sort of guy. And actually if he passes the test and gets the Democratic nomination, I was thinking he'd probably get my vote."

"Look, Ron," said a now serious Kraus, "Reggie is nice like a puppy dog is nice. And not half as smart. He does *only* what his staff of Harvard and Princeton brain-boys tell him, even though he doesn't know what in hell they're talking about seventy percent of the time—you want a person like that for senator? I'd rather have a

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clever turkey brain like Mel! But Reggie isn't going to pass, any more than Mel is."

"Yeah, the hell of it is I know you're right, Jack. But what's going to *happen! Who's* going to get the nomination for *either* party?"

"Beats me, Ron—I'm just here for the bucks! I figure both parties will eventually get someone to pass the test. But they won't be *our* guys! At least we'll be assured of reasonably intelligent, logical thinking candidates. But right now—I don't have the slightest idea who they might be."

"Good evening, ladies and gentlemen. This is Eric Peters, reporting *live* for the Broadcasting Services Unlimited Network at the first qualification problem solving tests to be held under the new federal election rules. With me tonight, as guest and expert commentator for BSU, is Dr. Andre Barbow. Dr. Barbow served as the special consultant to the congressional committee that drafted the original bill that eventually became the Federal Officeholder Qualification Law. As such, and as a computer expert, Dr. Barbow will interpret tonight's historic event for us. Welcome, Doctor, and thank you for being here with us tonight."

"Thank you, Eric. This *is* a historic occasion, and it is my pleasure to be able to add my impressions to the evening's festivities."

"Tell us, Dr. Barbow, what are your feelings on the possible outcome tonight? Does Governor Schluck have a reasonable chance of passing the test and qualifying for the Republican nomination for the Senate race? Does Reginald Smyth have a chance for the Democratic nomination?"

"Well, Eric, that's hard to estimate. Both men have been, I understand, in intensive training for the test. But you have to remember that both have never had any formal education, either in college or in their later years, in the hard sciences or mathematics. Their training has been limited to the traditional courses taken by lawyers. That might hurt. But I'll tell you, Eric, they're tough men, with heart and guts. Adversity is nothing new to them. I'm sure we'll see a real show of courage tonight!"

"Right you are, Doctor, and we'll be continuing our conversation with you shortly. We'll be right back, ladies and gentlemen, after this brief but important announcement."

CUT TO GROUP OF NEARLY NUDE GIRLS HIGH KICKING AROUND TEN-FOOT BOTTLE OF BEER, SINGING:
"Pasockee, Pasockee, Pasockee Beer,
That's the drink that makes you cheer!
Light and mellow, smooth and dry,
You'll like Pasockee, so give it a try!"

"Eric Peters here again, ladies and gentlemen, back with Dr. Andre Barbow. Doctor, maybe it would help give our audience a better perspective on what they'll be seeing tonight if you quickly review the history of the Federal Officeholder Qualification Law."

"Good idea, Eric! It has long been

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recognized, even as far back as ten years ago, that the introduction of the home microcomputer has led to a revolutionary alteration of the meaning of education in this country. Since those pioneering days of the early 1970's, when the Intel Corporation introduced the first commercial 'computer on a chip,' we have come to expect that the average person, to be called 'educated,' should know at least one high-level computer programming language, like BASIC, FORTRAN, or PASCAL. *And,* and here's the rub, Eric, he or she should know *how to solve problems* with the aid of a computer. The development of the Federal Officeholder Qualification Law is the logical conclusion of that realization—that is, to be a candidate for higher elective office, a person must openly demonstrate that he possesses such intellectual, decision making, problem solving skills."

"It *is* incredible, wouldn't you agree, Dr. Barbow, how the home computer revolution has seemed to happen almost overnight?"

"Well, actually yes and no, Eric. The growth process has always been there, but its pattern has been geometric, a *very* difficult one to perceive in its initial stages. I like to compare this kind of situation to a 'lilly pad in a pond.' Imagine you have a very large pond, with a very small lilly pad in the middle. Each hour the pad doubles in area. For a long time, it's not very big. But, eventually it gets to the point where it covers one-fourth of the pond's surface. One hour later, the pond is half covered. The very next hour, the entire pond disappears! The pond vanishes, at the end, with almost awesome speed. And this is exactly the process by which the home computer market has grown."

"It is this phenomenal growth that has led to the Federal Officeholder Qualification Law, then?"

"Absolutely, Eric. Because today, the average person is algorithmically literate. Let me put all this another way—the impact of the personal home computer is comparable to that of the hand gun in the Old West. The gun equalized man's *physical* differences. The private computer has gone a long way to doing the same for his intellectual differences. So much so, in fact, that it's now reasonable to expect, indeed insist, that our public servants *all* be the best that can be had."

"No question of that, Doctor, that's the American way! But right now we are going to take a break for another informative announcement from our sponsor."

CUT TO NEARLY NUDE DANCING GIRLS—

"Pasockee, Pasockee, Pasockee Beer,
The beer of the future is already here!
Goes great with nuts, pretzels or cheese,
Drink Pasockee Beer, it's sure to please!"

"Thank you, Dr. Barbow, for staying with us. But let's go back to the issue we touched on, just briefly, a few minutes ago. Not everybody has 'grown up' with the computer revolution. What about the experienced politicians, those men and women

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who have been around so long their early education missed the home computer revolution. Aren't they being discriminated against?"

"Yes, Eric, that's a serious problem, and we recognized it early in the game, when preparing the initial drafts of the Law. And that's why *all* people, present officeholders or not, who 'tryout,' will be given 'bonus' points on the basis of their age. The older you are, the more bonus points you get."

"But Doctor, won't that encourage *really* old people to run? I mean, they'll get a lot of bonus points. Isn't that right?"

"Yes, Eric, it is, but there's a tradeoff involved. You see, a person who is very old will probably do so poorly on the actual tests, themselves, that the bonus points will not be sufficient to score at a qualifying level. But anybody with reasonable intelligence, from twenty-five, to seventy-five years of age or so, should have no real trouble."

"Thank you, Dr. Andre Barbow, for those penetrating insights. But we must break away from this interesting line of discussion, as I see the candidates are coming on stage now, and the tests are about to begin! So here we go, ladies and gentlemen, the next three hours will be historic. Pick your favorite, place those little side-bets you might have, cross you fingers and—here we go!"

"This is Eric Peters, ladies and gentlemen, wrapping it up for you after tonight's historic events. Who would have guessed it—a dead heat tie!—with both Governor Schluck and Reginald Smyth getting thirty-seven points, each, *including* twenty 'bonus' age points. Thus, neither man qualifies for the candidacy of his party, which would have required a minimum of sixty-nine points.

"But, ladies and gentlemen, I want you to take a close look at the two disappointed men out there on center stage. Disappointed, yes. But defeated in spirit? No! What a marvelous lesson in personal integrity and good sportsmanship the Governor and his colleague are giving our young viewers. The Governor has his arm around Reginald Smyth's shoulders, and appears to be trying to buck up the spirits of his fallen comrade. I just wish we could get a mike down there so we could all hear what I'm sure are inspirational words. Words that would warm the hearts of all Americans!"

"Goddamn it, Smyth, we've just been royally screwed! And did you see that pompous bastard who did it—Barbow—up there in the press box area? Boy, would I like to fry his butt!"

"Well, Governor, forget it. It's over for both of us. So, forget it."

"You're a sniveling, spineless doormat—you know that, don't you, Smyth? The hell I'll forget! Look, when I came in here tonight I saw where that jerk Barbow parked his car—are you with me or not?"

"What do you mean—'with you'? What are you going to do?"

"Smyth, all you've got to do is stand

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look-out for me, understand? Now, let's get out to the parking lot before we get mobbed. I wonder how far Barbow will get tonight, after I let the air out of all four tires! And put a little sugar in the gas tank, too!" Schluck rolled three sugar cubes in his hands that he had swiped from a supermarket a few days earlier.

Reggie was shocked. "Would you *really* do that Governor? That could wreak his car!"

Schluck cackled with pleasure. "Would I do it? Follow me, Smyth, and watch!"

"Good evening, ladies and gentlemen. This is Eric Peters, your host on *Celebrity Interview.* This week's guest on the BSU Network is Dr. Andre Barbow, founder and president of the controversial Famous Programmers School. Dr. Barbow's professional credits are many. One, that you may recall from last month's election night coverage, was that of special consultant to the original congressional committee that put together the basic text of the now famous Federal Officeholder Qualification Law.

"We will question Dr. Barbow about his latest venture, right after this important commercial message."

CUT TO FOUR DOWDY-LOOKING HOUSEWIVES TOSSING ROLLS OF PAPER TOWELS INTO AIR AS THEY SING:

"Forget those spills, forget those drips,
No more fear of kitchen slips!
The scientific towel is the one to try,
Throw it on a puddle and it'll be dry, dry, dry!
Milk and water and juice and punch,
SPONGY towels drink them for lunch!
SPONGY towels, the scientific one,
A pound of SPONGY soaks up a ton!"

"O.K., folks, I do hope you'll seriously consider our sponsor's timely message. Now, let's talk to our guest, Dr. Andre Barbow. Welcome to *Celebrity Interview,* Doctor."

"Thanks, Eric, it's certainly nice to see you again."

"Yes, Doctor, the last time we met was on the occasion of the very first use of the Federal Officeholder Qualification Law. Please tell our audience, Doctor, of how you now evaluate that night, and all the other qualification results across the country, since the Law became effective."

"Well, Eric, things *have,* of course, been in a bit of a turmoil. As I recall, only five of the House candidates qualified, none of them incumbents, and no Senate candidates qualified at all. Certainly a rather disappointing outcome for the state party structures! Of course, we must also look on the brighter side of it—Capitol Hill will receive a fresh infusion of new blood. And, I would like to think, new and better brains!"

"Yes, Doctor, it will *if* computer qualified candidates can be found. What happens to Congress if the two parties *can't* find such candidates?"

"I understand your concern, Eric, but it really isn't a problem. First of all, there is the 'grandfather' clause in the Law. That will assure Congress will not collapse from a lack of bodies

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BIOLOG

by Jay Kay Klein

Jerry E. Pournelle is a big man, over six feet tall and well built. He is a passionate man, believing strongly and advocating firmly. He is equally articulate in a loud voice or with a bold pen. The result is often awesome.

Twice a Doctor of Philosophy—University of Washington in Psychology (1960) and Political Science (1964) Jerry is an advocate of rationality. To him this requires taking into account human nature and man's political structures when trying to interpret what technological advances will mean in our future. This makes him a futurist par excellence.

Earlier degrees provided Jerry with a background in mathematics and science: BS in mathematics and psychology, and MS in experimental statistics and systems engineering from the University of Washington. As a science fiction writer, sometimes collaborating with Larry Niven, he is considered a "hard science" writer. His first story, "Peace with Honor," appeared in the May, 1971 Analog. At the 1973 World Science Fiction Convention in Toronto, he received the first John W. Campbell Award for best new writer of the preceding two years.

Since 1970, Jerry has been a full-time writer, lecturer, and consultant. Previously, he was an executive assistant to the Mayor of Los Angeles, a professor of political science, and an aerospace psychologist and systems analyst. For the past several years he was a science columnist for Galaxy magazine. A collection of science columns, A Step Further Out, is due for publication soon, as is an Ace Illustrated Novel, Janissary.

Just a trace of softness in his voice betrays origins in Shreveport, Louisiana and upbringing in Memphis, Tennessee. He currently resides in Studio City, California. When his formidable work schedule permits, he enjoys sailing, war gaming, backpacking, and working with computers. He has also been Knight Marshal of the West, Society for Creative Anachronism; Officer, Military and Hospitaler Order of St. Lazarus of Jerusalem; Board Member of the Los Angeles Science Fantasy Society; and Hikemaster, Troop 139, Boy Scouts of America.

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to fill the seats."

"The 'grandfather' clause, Doctor? Just what is that?"

"The 'grandfather' clause, Eric, allows for the continuation in service of any congressperson, past the normal term of office, *if* no new candidate for election can be found. This is, admittedly, probably subject to challenge in the courts as unconstitutional. But I feel that by the time it reaches the Supreme Court, the danger period of crisis would have passed. So it's just our first level safety valve.

"Because, you see, even without the 'grandfather' clause, Eric, we would *still* have no problem. After all, there are plenty of bright, young, unemployed Ph.Ds in America who can program-up a storm. I believe there's a bountiful pool of qualified people—we just have to get them to give up being unemployed for a while, and encourage them to turn their interests to politics! And of course, the pay isn't bad, either!"

"Yes, I suppose you're right. But those people would all be neophytes at politics, with absolutely no experience in how things are done in Washington. Can the country afford to lose that vast backlog of knowledge?"

"No, Eric, it can't! The 'grandfather' clause, and the unemployed Ph.D resource, are really just stopgap measures. Our real hope still lies with the 'old pros.' We just have to 're-tool' them, so to speak, to bring them up to speed computerwise, and into the technological age!"

"Ah, Doctor, I'm glad you mentioned that! That brings us to your recent founding of the Famous Programmers School. Just what *is* that, anyway? But before you answer that question, Doctor, let's break for a message from one of our sponsors."

CUT TO LOW-SLUNG, POWERFUL AUTOMOBILE RACING UP A MOUNTAIN AT ONE HUNDRED MILES PER HOUR:

Voice-over narration: "Here it is America, the new super-stud BANGER, the most desired car of today! The automotive marvel of the decade, with four-hundred horsepower of pure, surging, sexy thrust with dual carburator combustion. Zero to ninety, five-second acceleration that will leave you panting. Buy a super stud BANGER and have all the women in your life panting, too!"

"O.K., Doctor, let me repeat the question. What is Famous Programmers School, your newest professional activity?"

"Eric, I'm so proud of Famous Programmers I could just bust the buttons off my vest! We have assembled some of the top minds in computer science around the country who then provide correspondence training to potential officeholders.

"Reginald Smyth—you may remember him from last month—is one of our charter membership students. And doing quite well, too, I understand! With the aid of our instructors, he has, in just *three* lessons, learned how to avoid infinite loops and, now get this, Eric, this is really just impressive as heck, he has *mastered* the

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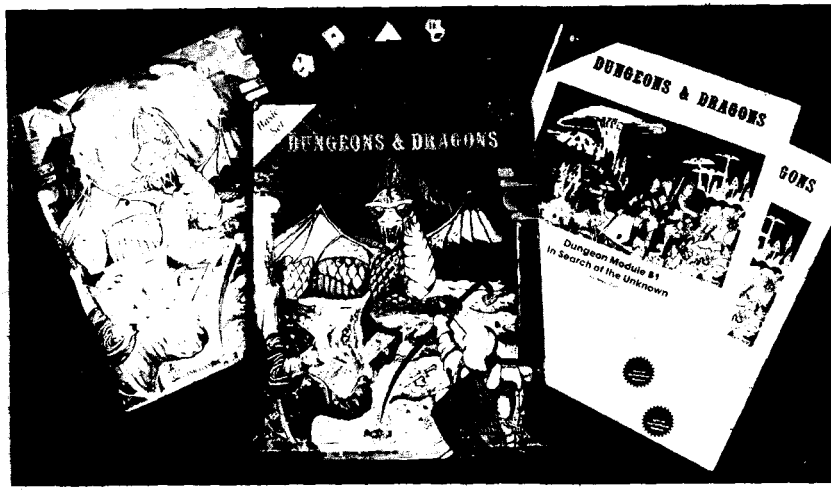
NOT JUST A GAME



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technique of inserting comment statements into his program listings to document the logic of his computer code. This is, as you may well know, contrary to all previously accepted political behavior, which says don't put *anything* in writing. Who says you can't teach an old dog new tricks!"

"Yes, that all sounds very good, Doctor, but surely you are aware of the criticism that has been directed at you. Namely that, first, you were a principal in the creation of the Law, and second, that you are now personally gaining from its enactment by establishing Famous Programmers. In effect, you've created a captive student body!"

"Eric, that's just pure, vicious, slanderous poppycock! I have merely pursued the American way of capitalism—I've identified a need, and I'm meeting that need. My previous involvement with the new Law is totally irrelevant."

"Certainly no one is accusing you of illegal actions, Doctor. Not yet, at least. But there *is* a grass-roots movement, headed by Governor Schluck, demanding an investigation of you and your Famous Programmers School. How do you answer those critics?"

"Eric, Governor Schluck is on a personal vendetta against me. First, he didn't qualify as a Senate candidate. And then there is that disgraceful episode after the tests where he was caught—red-handed!—vandalizing my car! If he didn't have the State Police in his back pocket, he'd be doing thirty days in the County Jail for criminal mischief! It's all sour grapes on his part, and I pay him no attention. And nobody else should either."

"Yes, Doctor, that *was* a curious incident with Governor Schluck. But I see we have time for just one more question. You say Famous Programmers is a *correspondence* school. How can you do that—how do the students get any 'hands-on' experience, so to speak? Isn't teaching computer operations, by *mail,* as impossible as it would be to teach how to be an *airplane pilot,* by correspondence?"

"Normally, Eric, using all previously accepted concepts of education, your skepticism would be warranted. We have developed, with the assistance of some of the top educational experts in the country, a broad spectrum of techniques to avoid the very problem you mention. We have put together a comprehensive learning package unique in its total impact. Yes, a truly *integrated pedagogical system* that presents an aggressive, hard-hitting, dynamic sequence of coordinated, interrelated lesson plans!"

"But Doctor, I don't think that actually addresses my question. Just what, *specifically,* do—what? No more time? Well, we're out of time, Doctor. Possibly we can pursue this on another day. Many thanks to our guest, Dr. Andre Barbow, President of Famous Programmers School.

"This is Eric Peters saying, so long from *Celebrity Interview*, another in one of the BSU Network's education-

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al presentations."

CUT TO WHITE-HAIRED, CONSERVATIVELY DRESSED, VERY SOPHISTICATED LOOKING MAN IN MOD GLASSES. HE IS SEATED IN FRONT OF AN IMPRESSIVE COMPUTER, WITH MAGNETIC TAPE DRIVES SPINNING, LINE PRINTERS OUTPUTTING PAPER AT AN ENORMOUS RATE, AND A TESLA COIL ARCING NEARBY. HIS RIGHT HAND RESTS ON A TELEPHONE RECEIVER. AN ATTRACTIVE, OLDER COUPLE READING A PROGRAM LISTING IS IN THE BACKGROUND. HE SPEAKS IN A LOW-KEY VOICE, AS SOFT MUSIC PLAYS:

"This message is for the very special man or woman. You are successful, a person who has met and mastered the challenges of life. You are established. You are the result of hard work, steadfast perseverance, and dedicated effort. And yet, and yet—there is one challenge left to you.

"Congress.

"Yes, precisely because of your high level of seniority, you missed the computer revolution. Due to new Federal Officeholder Qualification Law, you cannot qualify. But, this is merely a temporary difficulty.

"The Famous Programmers School, founded by one of the men who wrote the law, *can help you meet this final challenge. And with it, the prestige and honor of going to Washington can be yours, too. A Famous Programmers School diploma, earned in the privacy of your own home, is the mark of distinction, the symbol of the person who is a doer. Not a quitter.*

"Washington, with its power and its night life, is as close as your telephone (MAN GENTLY PATS TELEPHONE). *Call this toll-free number now* (NUMBER FLASHES ON SCREEN) *and arrange for a no commitment, no charge, evaluation test. No one will call.*

"Sign-up for a Famous Programmers session, however, and the future will *call. Don't delay, call today.*

"A Congressional seat, with your name on it, could be just around the corner!"

The picture tube of the color television imploded as a paperweight smashed through the screen. "That damn SOB! I'll see Barbow rotting in jail before this is over!"

A pale, shaking Mel Schluck stood screaming at his now smoking set. His face was contorted in a rage of frustration, and his fists clinched and relaxed reflexively. His blood pressure soared to 290 over 180, and the unsuspected congenital aortic aneurysm ballooned dangerously.

Schluck moved around his desk to reach for the telephone. "By God, this is just too much! I'll call a press conference and stick it to that bastard *in print*!" The arterial wall was stretched paper-thin now, and a trickle of blood started to seep through the yielding membrane. He began to punch in the number of the local UPI office. He got the first three numbers in, and then as his mind thought the fourth digit, the artery went forever past its Hook's limit. In a chest wrenching, gut shattering knife of blinding pain, the wall burst open and the blood of Melvin Schluck splattered off his lungs, into his abdominal cavity. Dead before he hit the floor, the Governor had failed his last test.

The coffin was finally alone, wait-

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ing for its last, short journey of six feet straight down. A cold, steady wind blew over the open yaw of the grave pit, scattering petals from the flower wreaths draped over the box. The crowd of mourners was already spreading out over the immaculate cemetery lawn, heading for the parking lot. Eric Peters, covering the funeral for BSU Network News, hurried after the familiar figure a few dozen feet ahead.

"Dr. Barbow, please wait!"

The rapidly striding figure turned, stopped, and waited for the approaching reporter. "Hello, Eric, *thought* I recognized you back at the services. How are you?"

"Fine, Doctor, thank you. But I'm surprised to see *you* here. After all, you and Schluck were hardly friends. In fact, except for his sudden death, he probably was going to cause you quite a lot of trouble. Why *did* you come, Doctor?"

"Eric, Governor Schluck's sudden passing *proves* that he was under enormous pressure. His strange behavior was evidently the direct result of the strain his deteriorating health put him under. You may not believe this, but I *always* admired the man. And it was only fitting that I pay my last respects." The reporter, rapidly taking notes, lowered his head as he wrote to hide a cynical smile. With Schluck out of the picture now, Barbow's problems were over. Barbow stuffed his hands into his coat pockets against the cold, and continued.

"Yes, Governor Schluck, in his own unique way, was a great man. I hold no ill feelings toward him—indeed, I think his memory should be honored. This is on the record, Eric. Famous Programmers School will begin to award a certain number of full tuition memorial scholarships in the Governor's name. Maybe two or three each year. We'll call the recipients 'Schluck Scholars'!"

"Well, Doctor," replied Peters, "that certainly is magnanimous of you. Also very politic. Any residual thoughts of pushing for an investigation of Famous Programmers School should be defused by *that* move."

"Come, come, Eric, there's no covert motive involved. Merely a gesture of honest emotion to remember a fine man. Just think—someday most members of the House and Senate could be graduates of Famous Programmers!" Barbow's face glowed with pleasure as he dwelled on the thought. The two men continued their walk away from the grave, into which the grounds staff were shoveling dirt.

"And think of *this*, Eric, think of this. We may even live to see the day when the President of the United States will be a Schluck Scholar! Now, wouldn't *that* be *something*!"

Eric Peters turned, almost involuntarily, to take one, last look at Schluck's grave. A slight shudder went through his body. *Jesus,* he thought, *the President of the United States a Schluck Scholar! You may be dead and buried, Governor, but I don't think you'll be forgotten. Nosir, not forgotten by a long shot!* ■

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A Planet Called Treason, Orson Scott Card, St. Martin's, 254 pp., $10.00
Hot Sleep: The Worthing Chronicle, Orson Scott Card, Ace, 416 pp., $2.25
Legion, Charles L. Grant, Berkley, 213 pp., no price indicated.
The End of Summer: Science Fiction of the Fifties, Barry N. Malzberg and Bill Pronzini, Eds., Ace, 320 pp., $1.95
Knave in Hand, Laurence M. Janifer, Ace, 216 pp., $1.75
Renaissance, A.E. van Vogt, Pocket Books, 190 pp., $1.95
Janissaries, Jerry Pournelle, Ace, 336 pp., $6.95
The Bug Wars, Robert L. Asprin, St. Martin's, 234 pp., $8.95
JEM, Frederik Pohl, St. Martin's, 359 pp., $10.00
A Usual Lunacy, D.G. Compton, Borgo Press, 191 pp., $3.95
Nightmare Express, Isidore Haiblum, Fawcett, 288 pp., $1.95
The Accident, Hans Heinrich Ziemann, St. Martin's, 327 pp., $10.95
Tomorrow and Beyond: Masterpieces of Science Fiction Art, Ian Summers, Ed., Workman, 158 pp., $9.95
Metamorphoses of Science Fiction, Darko Suvin, Yale University Press, 317 pp., $8.95 pb, $22.50 hb.
Ursula K. LeGuin: Voyager to Inner Lands and to Outer Space, Joe DeBolt, Ed., Kennikat, 221 pp., $15.00
Interstellar Travel: Past, Present, and Future, John W. Macvey, Avon, 303 pp., $2.25
Timewarps, John Gribbin, Delacorte, 205 pp., $8.95

the reference library

by Tom Easton

It is a classic truism that tastes differ, and in the stack of books before me for review, there are many I personally do not care for, even though I can see that they probably will appeal to some people. After all, a publisher paid good money for them, right? Some of them are by famous writers, aren't they?

Neither of these questions really has much to do with anything at all, though. Famous writers *do* produce turkeys or lose their edge before their publishers realize it. Publishers *do* publish trash, cynically betting on P.T. Barnum's truism that "There's a sucker born every minute" as well as on the parallel cliché that one man's meat is another man's poison.

I do not pretend to be able to tell trash from treasure in any absolute sense. I do think I can say what books appeal to me or have enough integrity of science, character, and writing to deserve some success. By the same token, I think I can spot the real dogs and warn you against them. I

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therefore see my job as book reviewer as one of labelling books, of saying, "I liked this one"; "I didn't like this one, but you might"; or "this one stinks"; and explaining the label just enough to let you have some basis to agree or disagree.

I might as well start with a good one—Orson Scott Card's **A Planet Called Treason.** This book is good enough that I have recommended it for a Nebula; if enough of my fellow SFWA members agree, it will make the final ballot and win the highest award the pros in this field can give each other. Why did I recommend it? Well, Card is a crackerjack writer, for one thing—all who read this magazine know that. For another, the story is a gem. Picture a metalless planet on which are dumped the political prisoners of a future interstellar "Republic." The prisoners' descendants have but one way to gain metal: find something the Republic might want, put it in the maw of a matter transmitter, and wait for approval and payment in the form of iron. The descendants are organized on family lines; each tribe or state bears the name of its founder and specializes in turning whatever specialty the founder brought to Treason into trade goods. For the Muellers, it's genetic engineering and organs for transplant, produced by Muellers who "regenerate" excess organs. For the Nkumai, it's physics. For others, you name it—though you will surely miss the gifts of the Schwartzes and the Andersons, on which the story turns. Suffice it to say that Treason is historical, external, and internal, and the story is of war and defeat and final victory, of emancipation from the last bonds of the Republic.

Card has another book out, too—**Hot Sleep: The Worthing Chronicle.** This one isn't as good, to my mind, perhaps because it is one more (and the last) entry in his tale of Capitol, where immortality is approached by spreading life thin, by "living" only one year in ten (or whatever other ration one earns) while sleeping away the rest. Here, Card tells how the system is finally destroyed by the altruism of one Abner Doon, a collector and manipulator of talented others, such as the mind-reading "Swipe" Jason Worthing. Since being a Swipe means automatic execution, young Jason's discovery of his talent is fraught with anxiety, relieved only when he meets Doon and is steered into the Service to become a starship pilot. Political intrigues culminate in Jason's eventual exile from Capitol at the helm of a colony ship, two thirds of whose cargo is destroyed by enemy action before he ever gets near his target, far beyond the borders of the human realm. He manages to get the colony established, though, and he steers it past innumerable obstacles, not the least of which are of his own making. In the end, he has built a society that promises to come near a utopian ideal, perhaps because the planet, like Treason, lacks metals. (Does Card blame the present plight of technological civilization on the resources that made technology possible?)

Until now, Card's Capitol stories have struck me as boringly involuted. The same is true of *Hot Sleep,* but only to a degree. The novel is saved, for me, by its non-Capitol aspects, by the treatment of the colony and its

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problems. If you recall the technology that makes Capitol possible, you remember that when a sleeper wakes, his mind is blank and must be filled by playing a tape of his pre-sleep memories. Since the damage to the colony ship includes the destruction of most of the sleeping colonists' memory tapes, Jason has to start his colony with people whose minds are little more than an infant's *tabula rasa* (yes, he changes their diapers). He thus has the perfect opportunity to attain utopia. What he makes of it, I leave for you to discover.

Another "chronicle" is Charles Grant's **Legion.** This is one of the entries in his future history centered on the Parric family. It takes place near the end of the 23rd century, when Earth civilization is rebuilding after a time of war and plague, when two forces are contending for leadership of what was once the USA. The writing is competent, the character fairly well realized, and the pace fairly brisk, but there is none of Card's intellectual originality. *Legion* seems too much like all the other post-holocaust yarns we have read; I wonder why people keep bothering, especially when they must know they will inevitably be compared to Pangborn. Particular problems with *Legion* include some weakness in the hero's motivations and an ambivalence in the writer's own mind—he is inconsistent in two descriptions of a crucial scene; the inconsistency seems to mark his adoption of a stage-play metaphor for the story's action, instead of the more straightforward treatment of the tale as cold reality.

According to Barry Malzberg, in the introduction to **The End of Summer,** "...as that second and less significant false spring of the late sixties and early seventies also ebbs, the true dimensions of the accomplishments of the fifties reappear. However dimly. It is more than time to take another look at them." How true. I discovered science fiction twenty years ago, right at the end of that proverbial heyday. The town library was full of goodies, and for several years I thrived on fifties fare. But I ran out in time and had to be content with more current stuff—stuff that somehow never seemed to live up to my first impressions. Now I know my disappointment was more than just another case of "familiarity breeds contempt." The fifties really were paradise for SF readers, and Malzberg and Bill Pronzini have documented the case anew. Sixty percent of their selections are from this magazine, and more than that are unfamiliar to me. They are all gems, from Budrys' title story through all the rest by the likes of Asimov, Knight, Bester, Kornbluth, Leiber, and more. I heartily recommend this book, both for longtime fans and as an introduction for the neophyte.

Laurence Janifer seems to be trying to develop a Matt Helm of the spaceways, though not too successfully (Zelazny has come closer). His hero is Gerald Knave: Survivor, as it says on his business cards. The man is a freelance interstellar trouble-shooter, and in **Knave in Hand,** sequel to *Survivor,* he is called in to solve the theft of the non-Crown non-Jewels of an alien civilization. In the end, after much confusion, noise, violence, and bad jokes, he prevents an inter-species war of annihilation whose likely loser

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is less than obvious. The book's a lightweight, an easy read despite the supposedly baffling aliens. It is not very challenging—to author or reader—but it may be worth reading as a curiosity of the genre.

When I was young, I thought van Vogt was great. I still think he has done good work. But now—well, as he says himself, everything he writes reflects dianetics, that product of a SF writer who took himself too seriously. (Or did he? L. Ron Hubbard was once supposedly heard to say that the best way to get rich was to invent a religion. Then he went and did it.) Van Vogt does not mean to say his work is now stylistically and intellectually feeble, but that does seem to be the way of it. His plots are unlikely, his science is outrageous, his motivations are impossible. For instance, imagine the world of **Renaissance**, in which present gender roles are switched—females are dominant, males are submissive (quite a chestnut, however topical)—thanks to alien meddling in the form of dosing males with drugs at puberty to make them nearsighted and then making them wear rose-colored glasses. But, as soon as the hero whips off his glasses, everything goes back to normal! Women take their proper position, the aliens see the light, and the hero becomes the ruler of the world.

A new writer would find it impossible to sell such tripe. Unfortunately, an old "name" can, to the detriment of his own reputation, the field as a whole, and the new writer's chance to find a slot on some publisher's list. I wish there were a solution, but people *do* buy books according to the author's name and publishers *do* know this. They would be foolish to do anything else. By and large, track record is a good predictor of success. But when it comes to horses, a track record survives very few losses before the has-been horse is put out to pasture (or to stud). Why can't we do the same with has-been writers?

A related situation is presented by Jerry Pournelle's **Janissaries**, a heavily illustrated book that will enjoy a glorious amount of publicity and will probably sell stacks and stacks of copies. It seems aimed at the credulous von Däniken fan; in other words, it is simple-minded in motivation, plot, and detail. It is nothing compared to Pournelle's previous work, which gave him, I suppose, the reputation that lets him get away with abominations such as this.

The book involves a squad of white mercenaries who are rescued from an African death-trap by flying saucer and taken to another world, where they are to pacify an area and raise drugs for their benefactors. Along the way, a Truth emerges that promises to let humans achieve membership in galactic civilization instead of their present exploitation (as kidnapped slaves and civil servants). The framework is superficially rational, but I enjoyed Daley's *The Doomfarers of Coramunde* much more, for all its magical apparatus.

On a more positive note, there is Bob Asprin's latest, **The Bug Wars**, a good example of that variety of SF that focuses on aliens to the exclusion of humans; there isn't a human being in the book. Of course, the author being one of us, the aliens are actually pretty human, but Asprin's creations are more alien than many. They are

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the reptilian Tzen, locked in a battle for supremacy with several species of intelligent insects. Both combatants have obtained their space-going technology from an undefined forerunner, the insects as a gift, the Tzen by deciphering the ruins left after the insects turned on their benefactors. And the Tzen are winning—they are creative enough to extend their found-science, able enough to defeat the most vicious of enemies, and compassionate or wise enough not to fight a war of extermination. This last, in fact, is how they define good and evil: evil cares nothing for ecological balance, but destroys without end, while good aims to preserve or re-establish the balance. As a biologist, I find this as useful a definition as any I have ever heard, and one much less dependent on cultural idiosyncracies. It is such thoughtfulness that removes *The Bug Wars* from the ranks of most shoot'em-up-bang-bangs and makes it much more worth reading than first impressions may suggest.

Frederik Pohl, along with Algis Budrys, is one of the only two SF writers of the fifties who have successfully returned to the fold. And their return is something we should all be thankful for. Both men have added a remarkable luster to recent SF, not simply because what they write is eminently readable, but also because the years have changed them, made their stories more mature, thoughtful, and even elegant. At the same time, at least in Pohl's case, there remain echoes of the fifties. Pohl posits a world divided into three camps, the Fats, the Greasies, and the Peeps (the exporters of food, fuel, and people), short on resources, embroiled as usual in politics, yet nevertheless sending out interstellar probes and, when it can manage it, colonizing parties. **JEM** is the story of one such party. It is the story of final breakdown on Earth, of the final war, and the sudden forced independence of the colony, which must then find a way to reconcile its divisions, both among the colonists and between the colonists and the three excellently depicted native sapient species, if it is to survive the violent changes its world periodically experiences. The writing is good, very good, as we can expect from Pohl. But I find the social structure he posits as the driving force of events much too simplistic. It seems based more on newspaper headlines than on reality, while the two often have only a tenuous relationship. This seems somehow appropriate to the fifties, but today's SF writers try to be more true to reality, even though the truth is more complex and much more

Every great ***scientific truth***
goes through three stages.
First people say it conflicts with the Bible.
Next, they say it has been discovered before. Lastly,
they say they have always believed it.

LOUIS AGASSIZ

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difficult to limn. *JEM* is a good novel, and worth reading, but I don't believe it is quite worth the prizes its author's name will guarantee it.

Pornographic science fiction can be fun. It is, however, rare above the level of the scuzzy paperback. An example is D.G. Compton's **A Usual Lunacy**. Framed as a courtroom drama with plenty of background flashbacks providing the bulk of the story, it supposes that love really is a virus and that two people whose viruses match respond to each other with the full Romeo-and-Juliet syndrome. The story's protagonist exploits the virus to hijack a hijack-proof airliner, and this is the crime for which he is on trial. And this is really enough of a description. Compton has a reputation for excellence and bleakness, documented in an Afterword by George Edgar Slusser, but he is all too often as turgid as only a Britisher can be. *A Usual Lunacy* is sexy stuff, but the only stiffness I got out of it was from boredom.

Isidore Haiblum's **Nightmare Express** concerns aliens who are exploiting the effects of a black hole to conquer Earth and the scientist whose efforts to block them have scrambled time, weaving the lives of the novel's characters in and out of past, present, and parallel history. The weaving produces so much confusion that it sometimes seems designed to do nothing so much as show off the author's versatility, but there is movement toward a resolution of the plot, a moment of madly turning tables, betrayal, and loyalty, in which the world is saved by a robot. (Or is it?) You may or may not like the book. If you care for Ron Goulart's confections, I expect that you will indeed enjoy it.

The last piece of fiction for this column is borderline SF, borderline because it belongs to that subgenre known as the disaster novel. The science is contemporary, the key "what if...?" is a "what if something goes wrong?" and the story is as topical as can be in the wake of Three Mile Island. Ziemann's **The Accident**, translated from the German edition of last year, concerns sabotage of the 2,000 megawatt German nuclear plant, Helios, on its dedication day. The style is so deceptively simple that for the first half of the book I was not impressed, telling myself that Walter Wager could have handled the story with much more suspense. The reaction is accurate enough, but suspense is not really the point of the story. Inevitability is, and Ziemann's style reflects this. Events succeed events implacably until the core melts and the containment dome is breached, releasing a cloud of radioactive dust and gas into a breeze destined for Frankfurt. The only solution appears to be to torch the city of Darmstadt to create an updraft that will disperse the cloud. The climactic scene, when swarms of 747's, L-1011's, and other civilian aircraft dump their fuel loads over the partially evacuated town and U.S., German, NATO, and other fighters and bombers release their rockets and bombs to ignite the city, is guaranteed to shake you as you have not been shaken since the first war movie you ever saw. It will make you forget all the benefits of nuclear power and join the next protest group you run into, which is, really, a shame. People are scared enough already, and a Helios

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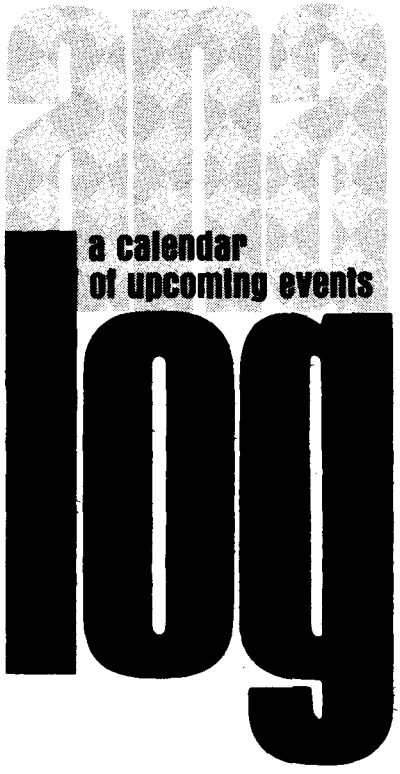

*Items for the Calendar should be sent to the Editorial Offices, **four months** in advance of the issue in which you want the item to appear.*

30 November-2 December
NUTRIACON '79 (SF conference) at Grand Hotel, New Orleans, La. Guest of Honor—Karl Edward Wagner, Fan Guest of Honor—Bob Tucker, Toastmaster—George Alec Effinger. Registration $6 until Halloween 1979, $9 thereafter and at the door. Info: Tom Longo, 6221 Wadsworth, New Orleans LA 70122.

10-12 December
2nd Miami International Conference on Alternative Energy Sources (Univ. of Miami) at Miami Beach, Fla. Info: T.N. Veziroglu, Director, Clean Energy Res. Inst., Univ. of Miami, P.O. Box 248294, Coral Gables FL 33124.

10-12 December
Electron and Atomic Physics Divisional Meeting of the American Physical Society at Houston, Tex. Info: APS, 335 East 45th Street, New York NY 10017.

24-25 December
XmasCon at Santa's Workshop, North Pole. Guests of Honor—Donner and Blitzen, Fan Guest of Honor—Rudolph. Registration free but membership is limited to good little girls and boys. Info: K. Kringle, RFD 90 North.

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29 August-1 September 1980
NOREASCON TWO (38th World Science Fiction Convention) at Sheraton-Boston Hotel and Hynes Civic Auditorium, Boston, Masstts. Guests of Honor—Kate Wilhelm and Damon Knight, Fan Guest of Honor—Bruce Pelz, Toastmaster—Bob Silverberg. Registration $30 until 31 December 1979, nonattending membership $8 at all times. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: Noreascon 2, P.O. Box 46, MIT Branch Post Office, Cambridge MA 02139.

ANTHONY LEWIS

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disaster *is* extremely unlikely.

We can get away from the pure fiction by turning to **Tomorrow and Beyond: Masterpieces of Science Fiction Art**. The book is a large-format trade paperback devoted to reproducing what editor Summers thinks are the best artworks connected with SF and fantasy. They include book jackets, album covers, advertising work, and annual report decorations, as well as unpublished pieces created for the artists' private pleasures. They are not, of course, all masterpieces, but the book does include some marvelous visual treats, including the samples of Hickman, Morrill, Schoenherr, Vallejo, Alexander, Maitz, and many others.

We can get still further away by turning to this month's two works of SF criticism. Darko Suvin is a much cited student of our field, but what he writes suffers from the great disadvantage of being steeped in an academic jargon that leaves it comprehensible mainly to his professional peers. And that is a shame. His **Metamorphoses of Science Fiction** is a valuable discussion of the dominant threads of this genre from its origins up to about the time of Wells. He defines SF as "a literary genre whose necessary and sufficient conditions are the presence and interaction of estrangement and cognition, and whose main formal device is an imaginative framework alternative to the author's empirical environment" (pp. 7-8). He then elaborates on this definition at exhaustive length, bringing in the role of the "novum" (the assumed new knowledge or device needed for the story) and saying such things as that the shift of the SF locus from space to time can be associated with the rise of capitalism. This is not the only way in which Suvin's Marxism (he is a native of Yugoslavia) appears, and I cannot help but think that when he seems to judge a work's quality in terms of how closely it matches his ideals, he is way off base. Ideology may be crucial to understanding the author and his or her intent in writing, but it can have nothing to do with quality if quality is to have any meaning at all. I would not suggest you invest in this book unless you are a critic yourself; anyone else is too likely to be unbearably aggravated.

The volume edited by Joe DeBolt is another matter. **Ursula K. LeGuin: Voyager to Inner Lands and to Outer Space** is billed as the first book-length examination of Ursula K. LeGuin's work, a recognition she richly deserves. It contains an introduction by Barry Malzberg, a LeGuin biography by DeBolt, and eight analytical contributions by assorted professors of English, sociology, and anthropology. Two of the contributors are anarchists, apparently fascinated by LeGuin's treatment of their favorite philosophy in *The Dispossessed*. Like Suvin, these two gentlemen base their criticism in ideology, but they do not seem to use anarchism as their touchstone of quality; they discuss the novel more as an anarchist text. Of the other contributors, three offer the Earthsea Trilogy a gratifying amount of attention, one treats Taoist configurations in *The Dispossessed*, and three provide overviews from separate viewpoints. If you are interested in criticism and/or in LeGuin, this book should prove interesting.

And now for the nonfiction: two

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popular science books of particular interest to SF readers. John Macvey's **Interstellar Travel** is an at-times fanciful discussion of the possible ways humanity may reach the stars. He begins by discussing the case for intelligent aliens, establishing a paranoid theme on which he harps throughout the book: Are alien colonists/invaders on their way? Have they already arrived? (It is unfortunate that Macvey feels paranoia is the best way to get people interested in space when there are so many better arguments for the high frontier; but then again, he may be right.) He then brings in space curvature; the idea that black holes may offer tunnels through space and hence a way to travel faster then light; time dilation; tachyons; and navigation problems near light speed. He then returns to the question of alien intelligence and wonders whether aliens may not have left artifacts in the solar system. Finally, he offers a skeptical consideration of von Däniken questions and flying saucers; I presume he does so in an attempt to reach as large an audience as possible, for the bulk of the book is competently enough done to make me doubt he really shares the tendency to wide-eyed drool of von Däniken's fans. This last portion of the book, together with the paranoia, make it unsuited for anyone with any science background. The book might, however, do as a gift to your favorite high school student.

I much preferred John Gribbin's **Timewarps,** a more respectable, less fringe-oriented look at what time means to human beings and at a few of the theoretical possibilities for travel—via black hole—to past, future, and parallel time. Gribbin's argument leads through physics, Jung, and the *I Ching* to the notion "that the way to understand the nature of time may be through looking at the nature of consciousness, at the way the flash of illumination flits about the myriad pigeonholes of the cosmic sorting office," (p. 135). Is time a matter of directed attention? Is time travel simply a matter of looking back or forward from the moment (pigeonhole) presently attended to? Can parallel worlds be reached simply by shifting one's attention to another set of pigeonholes? Do "lucky" people, "psychics," "true dreamers," *choose* the pigeonholes that fit their wishes or visions? Intriguing concepts, all, far out enough to satisfy any fringe dweller, but based always on legitimate speculation (if not theory).

And that is enough for this month.

Happy Reading! ■

***Science** is neither a magic wand nor a poisoned arrow. Nor do I believe, as I have done in the past, that it is neutral in its impact. Its deepest pursuits are inextricably entwined with human purpose and existence.*

SIR BERNARD LOVELL

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brass tacks

Dear Mr. Schmidt:

On the question, in the March Guest Editorial, of what to have the computerized Dirty Word Remover insert into radio broadcasts in place of dirty words: It has been traditional, at least in movies and other pre-recorded media, that when deletion of a dirty word is part of the script it is replaced by a beep. Now what if the beep were to actually be a burst of digital code giving the deleted item's Dirty Word Number? Then those who are against censorship could buy little gadgets which would recognize the code and reconstruct the original word. (This could also be done from substitute words, but would cost more and would cause problems when the speaker actually tried to use the "substitute" word.)

THOMAS G. DIGBY

1043 N. Curson Ave. #6
Los Angeles, CA 90046

You may have something here. Keep working on it....

Sir:

Could you print this and my address for assistance from your readers?

I am researching how-to-do low-technology processes for converting gaseous fuels to liquid fuel. I am in need of any information available on this subject on any conversion process.

I also need patent numbers and titles of steam power and steam-related inventions.

SFC THEODORE FITZGERALD, U.S. ARMY

Box 6022, LSE
APO New York, 09224

Can anybody out there help?

Dear Stan:

Reference to the letter in March '79 Analog on nuclear waste, and recent talk about disposing of it in the sun.

Recall that there's really no such thing as waste—we don't know how to safely make use of the material. The problem is to find somewhere to put it, safely, while we do figure out how to use it.

Ten years from now we'll be crying for the 'waste' we threw away. Don't get rid of anything from a closed ecosystem—you may want it later.

A weak analogy—in the age of coal, cinders were a waste, but provided a track ballast and were better than salt and sand on the highways in winter.

PAT STAKEM

Interface Technology
P.O. Box 745
College Park, MD 20740

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Good point—and one that should receive careful consideration before *anything irreversible is done. After is too late.*

Dear Mr. Schmidt:

Even with a number of space-advocacy and professional organizations (see "Getting Involved in the Future," by Art Dula in July Analog), the U.S. civilian space budget has dropped to one-quarter of its 1966 peak level in real spending terms. Paradoxically, after a low near the end of the Apollo program, public support for space appears to have increased. We can see evidence of the increase in the popularity of magazines such as Analog, recent movies and the Voyager encounters.

Unfortunately, supporters of the space program do not seem to constitute a politically powerful force, nor is it clear whether such a force can be spawned from the present public interest in space.

Political action, however, is not the only avenue open to increased civilian space activity. The World Space Foundation is being created on the premise that, if provided a focus, a choice, and a rewarding feedback, those segments of the population which support further space exploration and development can themselves sponsor many of the significant space activities they wish to see. Rather than begging for someone else (the government and taxpayers) to fund their dreams, these people constitute an economic force themselves capable of launching major space endeavors.

Suppose ten percent of the population were willing to pay the price of a magazine subscription ($20.00/year) to see space projects of their own choosing happen. In return, these people would be offered opportunities for limited participation, and would be informed in detail about progress and results of their projects. With a matching number of people from elsewhere in the world, revenue could be doubled. By adding a small proportion of income from other sources, we reach nearly one billion dollars per year. From the United States alone, the contributions would exceed the entire NASA planetary program budget, out of which Voyager, Pioneer/Venus and Galileo are funded.

The value of this money may be magnified over time by managing a revenue-producing endowment. With the remainder, we could, for example, launch a Voyager-class mission every year to have the entire solar system explored with unmanned probes before the year 2000. Such revenue could purchase over twenty Shuttle flights per year, with annual payload mass nearly twice the total mass of spacecraft launched from all countries in 1978. All this may be started on a small scale, gaining ground with smaller projects, building toward long-term objectives.

This is the economic framework into which the World Space Foundation can grow. Both the National Geographic Society (with over ten million members) and the Cousteau Society exist in testimony of the impact which private funding may have on exploration.

At this time, our organization is in a founding phase directed toward attracting talented individuals for management, attracting a nucleus of members and attracting seed funding to begin operations.

Interested individuals may request

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free information by writing to our address. Any person may become a member in Founders of the World Space Foundation with a contribution of $5.00 or greater (larger amounts are encouraged). People with an interest in helping to shape the organization are encouraged to write and summarize any particular talents they might wish to apply to our creation.

ROBERT L. STAEHLE
PRESIDENT

Founders of the
World Space Foundation
Post Office Box Y
South Pasadena, CA 91030

Dear Mr. Schmidt:

A new space-oriented company, FARMER'S LOOP INTERPLANETARY, would like to make its views known to the readers of Analog per the request in the July 1979 issue.

In particular, FLI feels it is possible to begin mining the Planetoid Belt now. This operation should be profitable and should not require a whole new technology. The return should be higher than the 17.5% *allowed* on the proposed Alaska Gas Pipeline.

The technical and economic details are given in a special report available through FLI for $10. The report utilizes approved economic analysis techniques, develops a plan for mining the belt for common metals consumed by our civilization, and shows the common metals will pay while the noble metals simply won't be a significant part of the industry.

FLI would like to hear from all parties interested in space mining, or other space activity, and questions and comments are welcome.

The address is FLI, P.O. BOX 82037, COLLEGE, ALASKA 99708.

A.L. BACHMAN

Farmer's Loop Interplanetary
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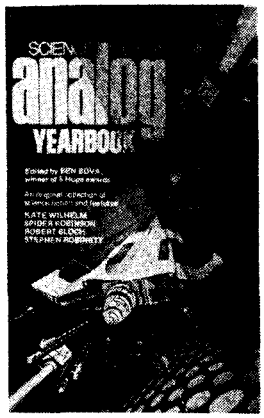

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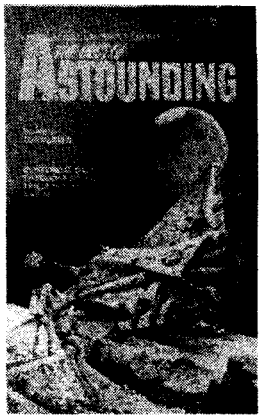

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